# DICTIONARY OF PRACTICAL APICULTURE

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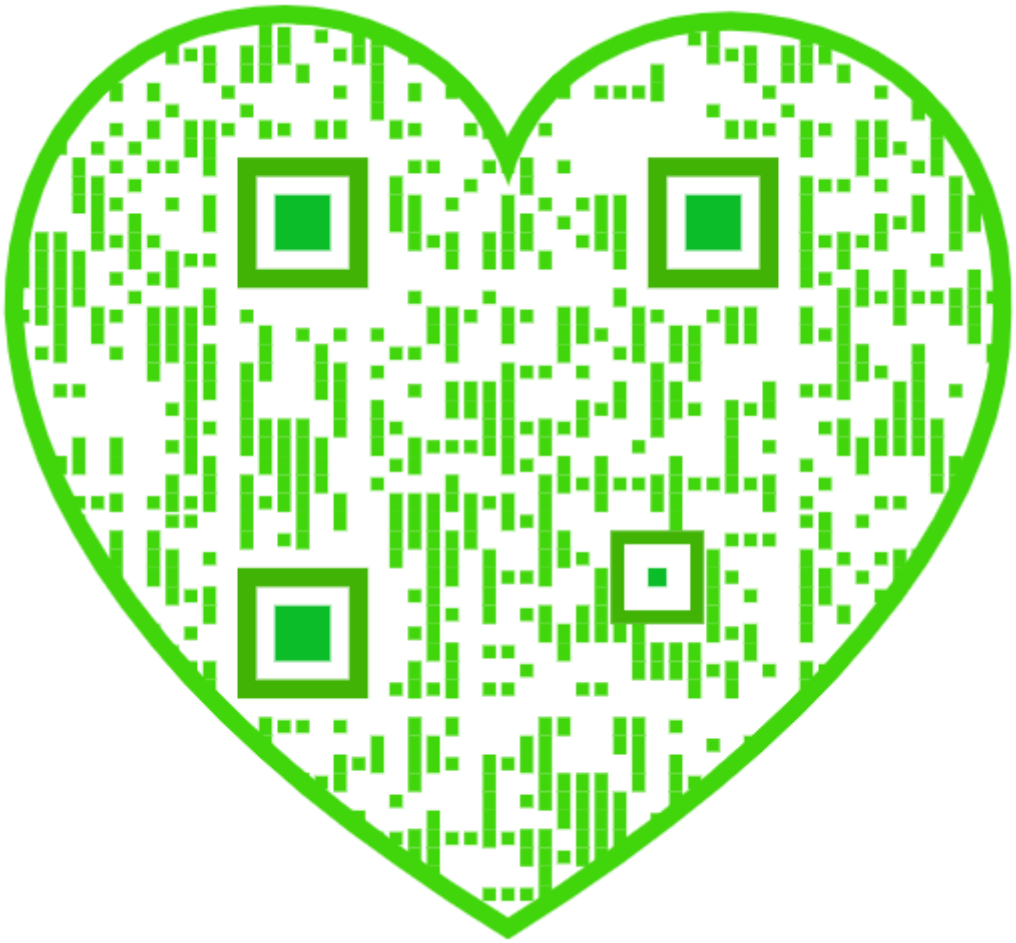

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# A DICTIONARY

— OF —

# Practical Apiculture.

GIVING THE CORRECT MEANING OF NEARLY FIVE HUNDRED TERMS, ACCORDING TO THE USAGE OF THE BEST WRITERS. INTENDED AS A GUIDE TO UNIFORMITY OF EXPRESSION AMONGST

## BEE-KEEPERS.

With Numerous Illustrations, Notes and Practical Hints.

1² 8682ª

BY JOHN PHIN,

AUTHOR OF "HOW TO USE THE MICROSCOPE," ETC. EDITOR OF "THE YOUNG SCIENTIST."

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# PREFACE.

THE compilation of the following collection of terms used in Bee-keeping was commenced some years ago, when the author held the position of Professor of Agriculture in the Agricultural College of the State of Pennsylvania. We believe the first Lectures on Apiculture ever delivered in any College or Technological School in this country, and practically illustrated by bees and hives, were those given by the author, during the year 1867, at the institution just named.

In preparing his lectures, the author was impressed with the importance of securing uniformity, accuracy, and definiteness in the terms used, and as a guide for himself and students, he compiled a brief vocabulary, extending to about two hundred and fifty vocables.

For some years subsequent to this time, he was unable to devote any attention to bee-keeping; the subject consequently dropped from his mind, the MSS. was laid away with other things, and by the merest accident escaped the disastrous fire at 37 Park Row, New York, which destroyed the author's working library, in January, 1881, as only a few days before the fire occurred the box containing it was removed to his residence. Having been recently placed in a position to resume his interest in that most fascinating of all pursuits—Apiculture—the old notes were found, and a perusal of them brought up many strange thoughts and associations. A pretty wide reading of books and journals, during the past year or two, had impressed the author more than ever with the importance of some general guide on this subject, and as the same feeling seemed to have taken possession of the minds of many prominent apiculturists, it was decided to publish it.

To this end the entire vocabulary was re-written and revised, so that the work has been brought down to the latest date. Few persons can have any idea of the amount of labor that this has involved, but notwithstanding the apparently very simple character of the volume which is the result, the number of general lexicons, special treatises on bees (from old Gervase Markham, 1610, down to Alley's work on Queen-Rearing), journals and technical works which have been laid under contribution, is a surprise to the author himself, now that the work is completed. He has taken nothing on trust, but has endeavored to refer to original authorities in every case, and as the great libraries of New York are singularly deficient in works on bee-keeping, he has been compelled to rely *wholly* on his own collection. This may possibly induce the reader to exercise more than usual leniency in regard to the shortcomings of the book.

A word or two in regard to the authorities upon whom we have relied may not be out of place. These authorities are of two very distinct kinds: 1. Works and papers on Apiculture; and 2. Dictionaries and treatises on Technology.

It is an unfortunate fact that most of the writers on bee-keeping have been deficient in general education—some of them even lamenting this fact in their works. Of course there are some notable exceptions—Markham (1610), Warder (1676), Dunbar, Cotton, Bevan, Langstroth, Cook, and a few others. We therefore find words used by such writers in different senses, and in many cases improperly—as, for example, the words hatch, hybrid, rabbet, etc. Now, while we have entered our protest against the improper use of well-known words, we must remember that in the false senses thus given to them, they have crept into general use, and such use is not to be lightly changed. As Herschel well says: "Hardly anything can counterbalance the evil of disturbing well-established names, which have once acquired a general circulation." Moreover it must be borne in mind that the functions of a technical dictionary like the present are two-fold: It should not only give the right word for the right place, but it should enable us to understand the writings of all those who have treated upon the subject. We at first proposed to confine this lexicon to those words only which are in general use, but we soon found the impossibility of so doing. The great difficulty of drawing any well-defined line rendered such a course out of the question. We have therefore given every word specially related to bee-keeping, with the exception of general botanical and entomological terms. To have included these would have doubled the size of the volume, without any corresponding practical gain. So, too, we have not deemed it advisable to discuss the names of *special* forms except in a general way. Thus we give not only *hive*, but *box hive, movable frame-hive, leaf-hive,* etc., but we have not felt that it came within the scope of our work to give descriptions of such modifications as the American hive, the Gallup hive, etc., etc. Neither have we attempted to exclude objectionable words. We have rather aimed to give every word, simply contenting ourselves with marking those that are obsolete or improper. Even such an absurd term as *moth-miller* finds its place in this Dictionary, so that the student may be warned against its use. Therefore, even the catalogues of dealers have been ransacked for terms and descriptions of various articles. Having secured the list of vocables, the next step was to note their meaning and mark those which are obsolete or improper. In this connection it will be found by the careful student that as regards technical subjects, we have, amongst our *dictionaries,* no *ultimate* authority—that is to say, none from whose decisions we do not feel perfectly at liberty to appeal without hesitation. Those who have studied our best and ablest dictionaries must have felt that in many points their deficiencies, as regards technical subjects, are so great that no independent worker will consent to be trammeled by them. We acknowledge them as authorities only *when we know them to be right.*

The list of the dictionaries which have served us in the preparation of this volume, includes all those of most importance. Beginning with Bailey (1735), Walker (1798), and adding Johnson, Ogilvie ("The Imperial Dictionary," 4 vols., edited by Annandale), Richardson (editions of 1838 and 1865), Webster, Worcester, and several minor ones, we have generally been able to get not only the *usual* meaning of the word under consideration, but its scope and and proper application. When any doubt occurred as to the propriety of the application of any word, we have sought firm ground through the medium of its history and etymology, and in this direction Skeats' Dictionary has proved invaluable. For special information in regard to chemical subjects we have relied upon Watt's "Dictionary of Chemistry" (8 vols.), and the works of Wagner, Muspratt, etc. The technical dictionaries of Ure (4 vols. 1878), Brande (3 vols. 1875), and the "Cyclopædia of Anatomy and Physiology," edited by Todd (5 vols. *v. d.*) have often been of service. From recent general cyclopædias, properly so-called, we have never received any very great assistance, and therefore have never made any special efforts to add them to our library. From the older cyclopædia of Rees, and the "Penny Cyclopædia," much interesting historical matter may be gleaned. These we have, as also the "Lexicon Technicum" of Harris (1710), Jamieson's "Dictionary of Arts and Sciences," Gwilt's "Cyclopædia of Architecture," Nicholson's "Architectural Dictionary," etc., all of which have been occasionally consulted with good results. The Botanical Glossaries of the late Prof. Balfour, and of M. C. Cooke, we have referred to for some words. In entomology, Westwood, Burmeister, Kirby and Spence, Harris, Duncan, Packard and Shuckard have been at hand.

In matters of general apicultural practice we have depended largely upon our own experience, which began more than a quarter of a century ago, and enables us to look back with interest to the time when we procured our first Italian Queen from the early product of the importation of S. B. Parsons. This we have supplemented with the records given by others in the journals devoted to apiculture. We were among the early subscribers to the *American Bee Journal*, and although we did not take it for many years, we have now a nearly complete set of this most valuable periodical.

Throughout the work we have endeavored to reach a dispassionate and unprejudiced conclusion as to the value and significance of each word *as used by the best authorities.* It is only in a few cases that we have obtruded our own personal preferences and opinions as against the *general* custom. In some of these instances we are so clearly and decidedly right that the words we condemn will never again be used by *respectable* writers in the senses which we have condemned. Such words are *hatch, rabbet,* and a few others. Then we have words in regard to which we know we are right, though we are not quite so

sure of being able to convince others of the fact; *fertile* and *hybrid* are good examples of such words. And lastly, there are the compound words formed from the word egg: Egg-workers, egg-drones, egg-queens. In regard to these, all we can say is that if we are not right we ought to be. Philologically and scientifically we are correct; whether others will see it in the same light that we do is of course a question to be determined. We await the decision of the majority. It may, not, however, be out of place to present here the reasons for the change, which we have proposed. In speaking of the different kinds of eggs laid by the queen (perhaps different *conditioned* eggs would be more correct, as all the eggs are probably of one kind) it is usual to speak of "worker eggs" and "drone eggs," when we wish to designate eggs which respectively will produce drones or workers.

Now, to the ordinary reader, knowing nothing of bee-keeping, but thoroughly understanding English, these terms would signify eggs laid by workers and by drones, just as we speak of hen eggs, duck eggs, turkey eggs, when we refer to eggs laid by turkeys, ducks and hens. *And in fact the term worker eggs does sometimes mean eggs laid by workers.* The ordinary expressions, therefore, are not only nonsense, but absolutely incorrect in some cases; for example, we have no such thing as "drone eggs;" drones do not lay eggs. But if we use the word egg as a prefix to the words drone, worker, queen, we then express accurately the facts in the case and "egg-drones," "egg-workers," and "egg-queens," denote queens, workers and drones in the condition of eggs. We thus secure scientific accuracy, and avoid the double meaning which attaches at present to the expression "worker eggs."

We have included in this Dictionary the names of the different new races of bees that have been described and recommended. It is proper to say that in this department we have had little or no experience; the descriptions have been copied from the best accessible sources, and are given for what they are worth.

In sending forth this little work the author would ask those into whose hands it may fall to give him, either personally or through the Bee Journals, such criticisms on mistakes and omissions as their knowledge may suggest. All such criticisms will be taken kindly, where kindly meant, for no one appreciates more fully than he does the shortcomings of this work. And although it is one of the sound canons of literature—one which the writer has never yet violated—that an author should not reply to his critics, yet in this case, as he believes that the general good will be best served by so doing, he will either accept any sensible corrections that may be offered, or give his reasons for rejecting them.

JOHN PHIN.

*Cedar Brae, Paterson, N. J., March,* 1884.

# INTRODUCTION.

"The imposition of a name on any subject of contemplation, be it a material object, a phenomenon of nature, or a group of facts and relations, looked upon in a peculiar point of view, is an epoch in its history of great importance. It not only enables us readily to refer to it in conversation or writing, without circumlocution, but, what is of more consequence, it gives it a recognized existence in our own minds, as a matter for separate and peculiar consideration; places it on a list for examination; and renders it a head or title, under which information of various descriptions may be arranged; and, in consequence, fits it to perform the office of a connecting link between all the subjects to which such information may refer."

*Sir J. F. W. Herschell.*

Not only is our language governed by our ideas, but our ideas, thoughts, and reasoning are too often governed by our language. Loose language is the invariable accompaniment of indefinite thoughts, while that which can be clearly expressed is in general clearly and definitely comprehended. And the logician well knows the dangerous fallacies which may be introduced by giving one meaning to certain terms at one time, and a different meaning at another. "The use of language is not confined to its being the medium through which we communicate our ideas to one another; it fulfils a no less important function as an instrument of thought, not being merely its vehicle, but giving it wings for flight. Metaphysicians are agreed that scarcely any of our intellectual operations could be carried on, to any considerable extent, without the agency of words. None but those who are conversant with the philosophy of mental phenomena can be aware of the immense influence that is exercised by language in promoting the development of our ideas, in fixing them in the mind and detaining them for steady contemplation. In every process of reasoning, language enters as an essential element. Words are the instruments by which we form all

our abstractions, by which we fashion and embody our ideas, and by which we are enabled to glide along a series of premises and conclusions with a rapidity so great as to leave in the memory no trace of the successive steps of the process; and we remain unconscious how much we owe to this potent auxiliary of the reasoning faculty."—*Roget.*

It is obvious, however, that if language is to serve us in any such capacity as this, its terms must be accurate and precise, and this precision which is so desirable for our own sakes becomes imperative, if we would seek to learn from others or to teach them. If in ordinary technical matters the terms used are indefinite, we must fail to understand or to be understood, and if they have several different meanings, we will soon find ourselves in the condition of the workers at Babel—asking for bricks and getting mortar.

Care should therefore be taken to secure uniformity, and this can only be done by carefully studying the different meanings which have been accepted for different words, and rigorously adopting one to the exclusion of all the rest.

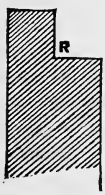
It is true that in addition to accuracy a certain degree of elegance is desirable. This can best be attained by careful attention to the principles which govern the construction and use of language, and the exclusion of certain words which are inelegant, unpronounceable, and formed in violation of the accepted canons of philology. A general treatise upon this subject would occupy more space than this entire volume, but it may not be out of place to state a few obvious elementary principles.

1. The first rule which ought to govern us in the use of technical terms is that if possible no word should have more than one meaning. Ignorant and uneducated persons who devise a new article are very apt to call it by some name which has already been appropriated to something else, and the consequence is that our technical dictionaries are full of words of double meaning. Better banish a word altogether than allow it to have two meanings. Fortunately, however, in bee-keeping, things have not gone so far that it is impossible to introduce a reform, provided suf-

ficient authority be given to the right words to enforce their use by writers on subjects connected with this art. The words, colony, hatch, hive, stock, swarm, and some others, are all used at present in several senses, but the true meaning of each is so obvious that it forces itself upon the student as soon as it is presented, and then there is no danger of its ever afterwards being used in a wrong sense except in a moment of thoughtlessness from force of habit. We must acknowledge, however, that this latter danger is one that is not to be despised.

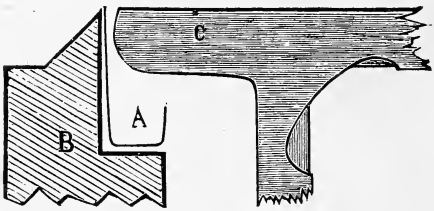
The words cap, clamp, rack, transfer, etc., have each more than one legitimate meaning, and it will be difficult, perhaps, to eradicate altogether the confusion which thus arises. We have made some progress in our efforts to present the subject clearly and soundly, but the matter is not yet fully matured. It demands very thorough examination and great caution, and should be fully discussed in the public journals before it is embodied in a book.

2. The second rule is, that well-known words, when used in a technical sense, should depart to as slight a degree as possible from the meaning which they have in ordinary language. It will be found that the great majority of technical words are merely ordinary words with a somewhat new meaning added; therefore they should never acquire a signification which shall be *opposed* to this meaning. This occurs, however, more frequently than one would suppose, and always without any good reason. Let us take the word *rabbet* as an example. As ordinarily used, and as applied technically by the carpenter, it has a well-defined and fixed meaning, and signifies the recess which is made in the edge of a board by removing a portion of the wood. Thus, for example, in the accompanying cut R is the rabbet. With the movable frame hive came a necessity for a recess in which the arms of the frames might rest, and as this recess was called a rabbet, the word came to be commonly used amongst bee-keepers; but, unfortunately, to their minds it conveyed an idea equivalent to that of *bearing* or *support*,



RABBET.

And so when it occurred to somebody to attach a thin strip of metal to the edge of the rabbet, so as to make it impossible for the bees to glue the arms fast, these strips were called rabbets!




TIN BEARING.

In the accompanying figure is shown a section of the upper edge of the end of a hive, B, and on the rabbet is seen a curved piece of tin, A, one edge of which is intended to support the arm, C, of the frame. These tin strips, A, are catalogued and sold as *rabbets*—the fact being that they are just the opposite of rabbets!! The proper name for them is *bearings* or *supports*.

Another word which has been changed somewhat in its meaning, though not wholly by bee-keepers, is the word *fertile*. Of this word Worcester judiciously remarks: "*Fertile* is applied especially to the soil; *fruitful* to trees and vegetables; *prolific* to animals" (See *Worcester's Dictionary*, *s.v. fertile*). It is now used by writers on bee-keeping to signify *pregnant*, and the word *fertilize* is employed as equivalent to *impregnate*. This misuse of the word came about through the botanists in this wise: Botany being a favorite study with young ladies of such an age that these words could not be used without a certain degree of indelicacy, teachers very commendably looked about for some other expression, and adopted *fertile* and its derivatives. From the botanists it passed to the bee-keepers, but without the same good reasons. To its use there are many objections, and it is strange that it should ever have been adopted, when the proper word

has been in general use so long. This word is *fecundate*,* with its derivatives as given in the body of this work.

This tendency to soften such expressions as convey coarse or indelicate ideas is a marked, and, from a certain point of view, a laudable trait; but, unfortunately, it is apt to introduce confusion by destroying the sharp clearness of our expressions, and by giving more than one meaning to each word. The tendency is well illustrated in the modern use of the word *meat*, which formerly was generally used to signify food of any kind, but has now come to serve as a substitute for the word *flesh*—the latter having been banished as conveying ideas of carrion and objectionable objects. If we ask a modern housekeeper if she has any meat in the house, she will certainly say "No!" unless her larder is provided with flesh of some kind, just as the little girl was puzzled to know why her papa said grace before tea—there being no flesh on the table, and her catechism expressly giving the grace as "to be said before *meat*."

This tendency towards euphemism, as it is called, that is, a softening of speech, is very general. It is seen in the use of the words "plain" for "ugly;" "fast" for "dissipated;" "gallant" for "licentious," and others. But it tends to defeat the very object which it has in view, as is well illustrated by Mill in his "System of Logic," by the following anecdote: At a certain period in French history the expression "to esteem" came to denote more than modern dictionaries give as its meaning. In short, it became a euphemism for licentiousness. A certain lady of the Court of France, when at confession one day, acknowledged that she had an "esteem" for a certain cavalier. "Combien de fois l'avez vous estimé?" was the question

* For authorities on this point, see Cuvier's "Animal Kingdom," edited by Prof. W. B. Carpenter, the well-known author of a standard work on Physiology, and Prof. J. O. Westwood, whose work on Entomology, in 2 vols., is an acknowledged authority. These two gentlemen are perhaps the highest authorities in the language. In giving the technical terms used in Zoology, at page 28 we find the following: "When there are sexes the male sex *fecundates*." In the translation of Huber's work, published in Edinburgh and London (Second Edition, 1808), the word *fecundate* is always used. See pages 8, 18, 20, 28, 33, 37, 44, etc., etc.

which came quickly back, and this having got abroad, put a stop forever to that use of the word.

The euphemism of to-day becomes the indelicate expression of to-morrow, and while we have really gained nothing, we have introduced confusion and error.

3. Scientific precision is an end that should always be carefully sought in our expressions. We do not mean by this that many-syllabled scientific terms should be used in preference to simpler words found in common use, but where the ordinary expression is loose and indefinite, the scientific word should always be used. A good example of this is found in the words *moth* and *miller*. Miller is no doubt a proper general term for the insect that has caused so much injury to bees, but then it is applied equally to any small butterfly as well as to a moth proper. Moth, on the other hand, has come to have a precise scientific meaning, and is altogether the best word. On the other hand, good, plain, common words are sometimes to be greatly preferred to the scientific substitutes used in their place, for the simple reason that the common name denotes the commercial article, while the scientific term can be properly applied only to a pure product, which bee-keepers rarely use, and to this extent it is inaccurate. Such a word is *farina;* it formerly meant flour or meal, and has been used as a synonym for pollen; it now means starch, or rather the pure starchy powder obtained from various grains. It is needless to say that true farina is not used by beekeepers; they use meal and flour, and these names are altogether to be preferred.

4. A certain degree of elegance and force should always be sought by every writer, and it will be found that short, familiar, anglo-saxon words are always to be preferred to those long compounds adopted from other languages. "Matrimonial excursion" is not nearly so good as "wedding flight"; "handling" is, in most cases, greatly to be preferred to "manipulation," though, the two words not being *quite* synonymous, the term "manipulation," which has a sub-audition of *operating* which *handling* lacks, cannot be altogether dispensed with. The same is true of the words "apiculture," "bee-keeping," and several others.

The inappropriate use of high-sounding words of foreign origin is exceedingly ridiculous, and, strange to say, it is not always the uneducated that are guilty in this respect. To use a technical word properly requires a knowledge not only of language, but of the arts, and with the latter there are but few classically educated men who are conversant. An instance came to our knowledge, a short time ago, where the head master of a classical school, not a thousand miles from New York, had presented to him for examination a new style of joint for uniting the pipes forming the water supply and sewage systems of buildings. The word *joint*, however, was too simple; in his eyes the term was "common," and therefore "unclean." Consequently, throughout the whole conversation he substituted the word "articulation" for joint—thus not only making himself ridiculous, but committing a positive error.

Hybrid words, that is, words which are made up of parts from different languages, are always inelegant, and should be rigorously condemned and thrown out of use. Such a word is *Bee-culture*. The first half is English, the second part is Latin, and the whole may be called "Macaronic."* The word *Apiculture*, on the other hand, is a legitimate word, and may well take its place beside Agriculture, Arboriculture, Floriculture, Horticulture, Pisciculture, Sericulture, Sylviculture, Viticulture, etc., etc., although it is not found in the unabridged edition of "Webster's Dictionary."

In some instances, an attempt has been made to adapt English words to special cases which they do not cover. This should be avoided, even at the cost of using a purely Latin or Greek word. Thus the word *midrib* has been used to denote the septum or partition between the two sheets of cells which are found in every comb. Now

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* The term "Macaronic" is applied to prose or poetry in which two languages are mixed up, each following its own inflections. The well-known verses, beginning—

"Felis sedit by a hole.
Intenta she cum omni soul,
Prendere rats."

form a good specimen of macaronic poetry.

the word "midrib," though good English, does not meet the case. It is a modern word, not found in Bailey (1735), Walker (1798), Richardson's Ed. of 1838, or even in Maunder (1838), who picked up almost everything in common use. Skeat does not give it. So far as we have been able to trace its history, it would appear to be a modern word used only by botanists to designate that extension of the petiole which passes along the middle of a leaf, and to apply it to the thin sheet of wax which forms the division between the ends of the two sets of cells in a piece of honey comb is decidedly wrong. The word *septum*, however, is short, easily pronounced, explicit, and, in spite of its Latin form, should be adopted. The word *diaphragm* might be used, but has never been suggested, so far as we know; it has no advantage over *septum*, and its length and complexity are against it.

# DICTIONARY

— OF —

# PRACTICAL APICULTURE.

**Abbreviations.**—Certain words in frequent use are generally abbreviated or contracted by writers on Bee-Keeping. This is certainly unobjectionable, being the same practice followed by botanists and others, and to those who are familiar with them they cause no confusion, though beginners are sometimes puzzled. The following are the principal abbreviations that we have met in the works in common use:

| | | | |
|---|---|---|---|
| Cb. | Comb. | L. | Langstroth. |
| Cmb. | | L. F. | Langstroth Frame. |
| Fdn. | Foundation. | Q. | Quinby. |
| H. | Hive. | Q. F. | Quinby Frame. |

Abbreviations which though not peculiar to Bee-Keeping are used in this book:

*a.* Adjective.

*n.* Noun.

*q. v. Quod vide*—which see—when placed after a word it means: Refer to that word. Thus: Comb (q. v.) directs us to look up the word *Cmb* for further information.

*s. v. Sub verbo.* Under the word or title. Thus: *s. v. Race* means that the desired information will be found under the title or heading *Race.*

*v.* Verb.

In the following pages we have indicated the part of speech of a word only when the same word occurs, sometimes as one part of speech, and sometimes as another.

**Abdomen.**—The third or most posterior of the sections into which the body of the bee is externally divided. It consists in the males of seven, and in the females of six segments. It contains the principal digestive and respiratory and the whole of the generative organs.

**Abnormal Swarm.**—A swarm is *abnormal* when it comes out under unusual conditions. (*Abnormal* meaning without law or contrary to known laws). In many cases, however, a colony leaves its hive in a body without really having the swarming impulse (See *Swarming Impulse*). Colonies under such conditions cannot properly be called *swarms*. The term *Deserting Colony* (q. v.) expresses the facts in a more satisfactory manner.

**Absconding Swarm.**—This term has been applied to a colony of bees under two very different conditions. The first and unquestionably the proper signification is a swarm, which, forming only part of the original colony, comes out under regular conditions and *absconds* or leaves for parts unknown. But sometimes it is applied to a colony which deserts its hive in a body—a phenomenon only too well known to careless bee-keepers. In the latter case there is nothing of the "swarming" character about the affair (See *Swarm*), and the term "Deserting Colony" would express the facts in a much better manner.

**Adapter.**—"A board to set glasses on."—*Keys.* What is now called a Honey-board.

**Adulteration.**—"This term is only properly applied to the *adding* of substances to articles of commerce, food or drink, for the purposes of deception or gain; but the term, by magistrates or analysts, is often practically applied to accidental impurity, or even in some cases to actual substitution."—*Blyth.* The strict etymological meaning of the word is the *adding of something else*, but like most other words, this one has come to have a much wider, though quite legitimate, signification. It includes the *taking away*, as well as the adding, of important ingredients. Thus tea and coffee may be properly said to be adulterated when the theine and caffeine have been abstracted, and sold separately, and the leaves or ground berries are then offered for sale as new.

The more common adulterations of the articles connected with apiculture will be found under the heads, *Honey, Sugar, Wax.*

Adulteration is one of the greatest enemies of the bee-keeper, as it not only excites suspicion in the minds of the public, but by unfair competition lowers the price of the pure article. Bee-keepers throughout the country should unite to secure laws visiting severe penalties upon this crime. We cannot trust to our scientific professors to expose and condemn it, as the history of oleomargarine very sadly showed. Indeed the names of many of our college professors are better known in connection with puffs of commercial articles, than for scientific research. The reform must begin with the people.

**After-Swarms.**—Swarms which come out a short time after the first swarm are called after-swarms, and are always led by virgin queens, of which they sometimes contain several. When sufficient time elapses for the supernumerary queens to be de-

stroyed in the original stock, the new queen to be fecundated, and queen cells to be raised from her progeny, the swarm may be called a *late* swarm, but cannot be called an after-swarm. Such a swarm is a *prime* swarm, as much as one sent out in May, because it is led by an old queen.

**Air-Space—Dead.**—A space filled with air and so completely enclosed that there is no communication with the external atmosphere. Such a space has been recommended by many prominent writers as being quite as good a non-conductor of heat as a similar space filled with loose material like straw, dry leaves, chaff, etc. This is a great mistake. The air, owing to its great mobility, carries the heat rapidly from one side of the apartment to the other, and so allows it to be dissipated. In fitting up hives with double walls for the purpose of protecting the inmates from great cold or sudden changes of weather, the space between the walls should always be packed with some light, porous material, which will effectually prevent all circulation of air in the confined space.

**Albino.**—By this term is properly meant a person or animal having an unnatural whiteness of the skin and hair, and what are called red eyes, the latter appearance being due to the entire absence of pigmentary matter, so that the pupil shows red. The term was first applied by the Portuguese to certain negroes they found on the coast of Africa, and who were born mottled or disfigured with white spots. In the albinos the eye is very weak and is of but little use during the daytime, being capable of seeing distinctly only in twilight or moonlight. Various races of domestic animals, as rabbits, ferrets, cats, etc., frequently show the albino peculiarity.

So much for the true albinos. The term is sometimes applied by bee-keepers to a strain of Italian bees which are rather lighter than usual, and which has the rows of white hairs unusually distinct. "They are not a distinct race. In fact I have often noticed among Italians the so-called Albinos."—*Cook.*

**Alighting Board.**—A board upon which the bees alight when they return to the hive. It may either be a part of the hive or a simple board laid in front of the entrance.

**Apiarian.**—The best authorities use this word as an adjective only. Thus we speak of "apiarian pursuits," "apiarian products," "apiarian implements," etc. The use of the word as denoting a person who keeps bees is against good usage. See *Apiarist.*

**Apiarist.**—One who keeps or cares for an apiary. A bee-keeper. Sometimes improperly called an *Apiarian.*

**Apiary.**—A place or establishment where bees are kept. The term apiary may mean either the locality or the "plant." Good custom sanctions both uses of the word.

**Apiator.**—A bee-keeper.

**Apiculture.**—Bee-keeping; the care and management of bees. The word *apiculture* is not recognized by many of our standard authorities, but we confess that we cannot see any objection to it. It stands on the same ground as *arboriculture, horticulture, viticulture,* etc., all of which are generally accepted. On the general principle that a good Anglo-Saxon word is always to be preferred when it can be used to equal advantage, we prefer the term *Bee-Keeping* to *Apiculture,* but at the same time it must be borne in mind that *apiculture* has a somewhat broader signification than *bee-keeping.* The term *bee-keeping,* therefore, cannot always take the place of the word *apiculture.*

**Apidæ.**—The name of the *Family* to which the honey-bee belongs. It includes several GENERA, one being *apis* in which the bee is found. See *Apis.*

**Apis.**—The name of the GENUS in which the honey-bee is found. Great differences of opinion exist as to the number of *species* which it includes. Westwood enumerates eight species, but later entomologists are inclined to regard most of these as mere varieties. Prof. Cook regards the following as distinct:

*Apis dorsata* of India and the East Indies, known as the Great Bee of Java.

*Apis Zonata* of the same island.

*Apis Indica* of India and China.

*Apis Florea* of India, Ceylon, China and Borneo.

*Apis mellifica,* our common honey-bee, of which the more common races will be found enumerated under the head *Bee* in this dictionary. Those who wish to study the position of the bee in the organic kingdom will find a most admirable resumé of the subject in Prof. Cook's "Manual of the Apiary."

See also *Race, Variety, Species* in this work

**Artificial Comb.**—See *Comb, artificial.*

**Artificial Fecundation.**—The impregnation of queens in confinement. Sometimes improperly called *artificial fertilization.*

**Artificial Honey.**—See *Honey, artificial.*

**Artificial Pasturage.**—Plants yielding honey and raised by cultivation as opposed to those that grow wild.

**Artificial Pollen.**—Flour and meal of various kinds are erroneously so called because they are frequently used as substitutes for the pollen of flowers.

**Artificial Swarm.**—See *Swarm, artificial.*

**Atavism.**—This is a medical term frequently used by breeders of stock. It signifies the recurrence of any peculiarity or disease of an ancestor in a subsequent generation after an intermission for a generation or two. See *Crying Back.*

**Balling a Queen.**—Bees occasionally surround the queen in a compact cluster or "ball." This is more apt to happen when a strange queen is introduced to a colony, but sometimes a

colony will ball their own queen if unusually excited or disturbed. The term is used in either case. If not soon released the queen dies and is thrown out of the hive. Dzierzon tells us that bees sometimes ball their queen for the purpose of protecting her from the attacks of strange bees.

**Barley Sugar.**—Sugar boiled till it is brittle when cool and then candied. So-called because it used to be boiled with a decoction of barley. See *Candy.*

**Bar Hives.**—Hives in which the combs are attached to bars instead of being enclosed in frames. The bar usually corresponds to the top bar of the ordinary frame, and the comb is suspended from it. It was used in early times, even before the invention of the *frame* by Langstroth. The frame has entirely superseded it in this country, though, strange to say, it is still used largely in Europe.

**Barren.**—Sterile. Incapable of producing young.

**Bars.**—Strips of wood to which combs are attached and from which they hang in bar-hives.

**Bee.**—The term *Bee* or Honey-Bee is properly applied only to the different species of the genus *Apis* (q. v.) which also include several varieties or races. See *Breed, Race, Variety.* Under the following heads: Albino, Black, Brown, Carniolan, Caucasian, Cyprian, Dalmatian, Egyptian, German, Heath, Holyland, Italian, Palestine, Syrian, will be a found a description of some of the races.

The term *Bee* has two meanings, just as the word *man* is used in two senses. The first and narrowest sense is that in which it is used to denote the full-grown bee and particularly the worker bee, when no other is signified. The second and broader signification includes the bee in every condition—queen, drone, worker, egg, larva, nymph, etc.

The life-history of the bee is briefly as follows: The males are known as *drones;* the perfect females as *queens,* of which only one is normally found in each colony; the imperfectly developed females as *workers.* Under normal conditions they are all developed from eggs laid by the queen or perfect female, and during the progress of this development they pass from the egg to the larval condition; from the larva to the pupa or nymph; from the nymph to the perfect bee—the time occupied in each step, some allowance being made for differences of temperature and other unknown conditions, being nearly as follows:

| | Egg. | Larva. | Sealed. | Entire Period. |
|---|---|---|---|---|
| Drone | 3 days. | 6½ days. | 14½ days. | 24 days. |
| Queen | 3 " | 5 " | 8 " | 16 " |
| Worker | 3 " | 5 " | 13 " | 21 " |

The pupa or nymph form is assumed only after the larva has been sealed for some time. At first the young bees do not leave the hive except for what is known as a "play-spell," in which

their wings are probably hardened and their muscles strengthened so as to prepare them for long flights when gathering honey and pollen. "The young bees build the comb, ventilate the hive, feed the larvæ and cap the cells. The older bees—for, as readily seen in Italianizing, the young bees do not go forth for the first two weeks—gather the honey, collect the pollen, or bee-bread, as it is generally called, bring in the propolis or bee glue, which is used to close openings and as a cement, supply the hive with water (?), defend the hive from all improper intrusion, destroy drones when their day of grace is past, kill and arrange for replacing worthless queens, destroy inchoate queens, drones and even workers, if circumstances demand it, and lead forth a portion of the bees when the conditions impel them to swarm. When there are no young bees, the old bees will act as house-keepers and nurses, which they otherwise refuse to do. The young bees, on the other hand, will not go forth to glean, even though there be no old bees to do this necessary part of bee-duties."—*Cook.*

Numerous attempts have been made to determine the number of bees in an ounce, a pound, a quart and a gallon, but their weight and bulk vary so much under different conditions that the results are not very satisfactory. A. I. Root gives 4,000 as the number of bees in a pound. These were probably well filled with honey. Keys, towards the close of the last century, prepared the following table which does not differ widely from Root's estimate.

NUMBER, WEIGHT AND MEASURE OF BEES.

| | | | lb. | oz. | dr. |
|---|---|---|---|---|---|
| 100 | Drones..... | | 0 | 1 | 0 |
| 290 | Workers..... | | 0 | 1 | 0 |
| 4,640 | " ..... | | 1 | 0 | 0 |
| 915 | " ..... | ½ pint | 0 | 3 | 2 |
| 1,830 | " ..... | 1 " | 0 | 6 | 5 |
| 3,660 | " ..... | 1 quart | 0 | 12 | 10 |
| 29,280 | " ..... | 1 peck | 6 | 5 | 6 |

The weight is avoirdupois and the measure the Winchester bushel, which contains 2150·42 cubic inches. The peck contains 537·5 cubic inches, and Keys says that a swarm filling this is the least that will prove productive. See *Nucleus.* He adds that these data are only approximative, as they will never come out twice alike.

**Bee-Bird.**—A local English name of the spotted flycatcher (Muscicapa grisola), so called from its catching bees.—*Ogilvie.*

**Bee-Box.**—A hive.

**Bee-Bread.**—The farinaceous matter which forms part of the food of bees. Generally it consists of pollen but bees sometimes, either of their own accord or under the influence of the bee-keeper, use flour and other matters. See *Pollen.*

**Bee Cap.**—A close fitting cap or hood used by European bee-keepers for the same purpose as our bee-veils (q. v.). It seems to us an expensive, awkward, suffocating contrivance when compared with our simple device.

**Bee Climbers.**—Iron stirrups with sharp steel points usually strapped to the leg, and used to aid the bee-hunter in climbing trees. Almost the same as those used by "line-men" when repairing telegraph lines.

**Bee-Culture.**—This word is equivalent to bee-keeping and apiculture. If used as two words it might be pardoned, but as a compound word, the several parts being from different languages, it violates the canons of sound philology and should be discarded. See *Apiculture.*

**Bee-Culturist.**—One who keeps bees. This word may not be absolete but it ought to be.

**Bee-Dress.**—A suit so arranged as to protect the entire person from the stings of bees. It is made in different ways, for a description of which see any good work on bee-keeping.—See *Veil.*

**Bee-Eater.**—A bird that feeds on bees. There are several species included in the genus Merops, of which the M. apiaster of Europe is remarkable for the brilliancy of its plumage.—*Ogilvie.*

**Bee-Garden.**—An apiary. A garden or enclosure to set bee-hives in.

**Bee Glass.**—A glass in which bees may store honey.—*Brande.*

**Bee Glue.**—Another name for propolis (q. v.).

**Bee-Gum.**—1. Since the black gum tree (Nyssa multiflora), one of the largest trees of the Southern States is almost always found hollow, bees in the wild state very frequently select this tree for a habitation. Man, taking the hint, in early days used a section of a hollow gum tree for a hive. Most hives were therefore really *gum-tree hives,* and hence the term *gum* or *bee-gum* came to mean any kind of hive. Properly, however, it signifies a hive made of a hollow log or tree.

2. Propolis is sometimes improperly so called.

**Bee Hawk.**—The honey buzzard (Pernis apivorus), so-called from preying on hymenopterous insects, such as wasps, etc. Lepidopterous insects of the genus Sesia are also often called bee-hawks or bee-hawk moths.—*Ogilvie.*

**Bee-Herd.**—An old name for a person who takes care of bees.

**Bee-Hive.**—See *Hive.*

**Bee-Hood.**—See *Bee-Cap.*

**Bee-House.**—The Imperial Dictionary and others define *bee-house* as a house for sheltering hives, and this is the generally accepted and, in English, the proper meaning of the term.

Some persons who have had a German training use the word in its German sense of bee-hive.

**Bee-Keeper.**—One who keeps bees. See *Apiculturist* and *bee-culturist.*

**Bee-Line.**—The shortest and most direct line from one place to another, like that of a bee through the air.

**Bee-Louse.**—A curious parasite found on the honey bee and named *Braula cœca* (Nitzsch). It is not common in this country, but does considerable injury to bees in Southern Europe. A figure and very excellent description are given in Prof. Cook's Manual. See also article *Parasite* in this Dictionary.

**Bee-Martin.**—A local name for the king bird—*Tyrannus Carolinensis.*

**Bee-Master.**—One who keeps bees.

**Bee Moth.**—See *Moth.*

**Bee Pasturage.**—Flowering plants from which bees gather honey. It is said to be *natural* or *wild* when it grows without cultivation and *artificial* when it is planted specially for bees. Some plants, such as the apple, raspberry, buckwheat, etc., occupy a middle position, being cultivated for fruit or grain, but at the same time yielding large quantities of honey.

**Bee Plants.**—Plants that yield honey.

**Bees-Wax.**—See *Wax.*

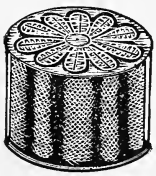
**Bee Tent.**—See *Tent.*

**Bee Tree.**—A tree, the trunk or a branch of which is hollow and inhabited by bees.

**Bee Veil.**—See *Veil.*

**Bee-Worm.**—An old name for the larva of the bee.—*Ray.*

**Bell-Glass.**—A glass vessel, shaped somewhat like a bell. They are used to a considerable extent as surplus receptacles by English bee-keepers. They present a very neat appearance, and when the comb is built in fancy shape, as shown in the figure, they are quite ornamental on the table. But honey stored in such glasses costs a good deal more than when stored in ordinary sections.



BELL-GLASS.

**Black Bee.**—1. The common honey bee; the kind usually kept in box hives. Called also *Brown Bee* and *German Bee.* See *Race.*

2. Robber bees that have lost their hair and become black and shiny were supposed by Huber to be a distinct kind of bee, and in several works they are mentioned by the name of *Black Bees.* They are, however, only the common bee.

**Bottom-Board.**—The board which forms the bottom of the hive. It may be either fixed or movable. The fixed bottom boards form part of the hive, while in the case of movable bottom boards, the hive is simply placed on them. Both kinds have their advantages and disadvantages. Van Deusen has invented a clamp by means of which the bottom board may be made either fixed or movable at will, thus securing all the advantages of both systems.

**Bottom Rail.**—The lower horizontal bar of a frame.

**Box Hive.**—A hive consisting of a plain box with a few cross-sticks for supporting the combs, In such a hive the comb and bees cannot be examined or handled and most of the operations of modern bee-keeping are impossible. Box hives are therefore things of the past, and bee-keepers who are behind the times are called "box-hive men." When we look back, however, and see what was accomplished by such men as Quinby, using box hives, we cannot fail to be impressed with the fact that thorough scientific work will always produce good results even with the poorest implements and in the face of the most formidable difficulties.

Those who have read the first edition of Quinby's "Mysteries of Bee-Keeping"—a work which will always be a classic no matter what improvements may be made in the art, will be greatly amused at the following extract from the latest edition of an English standard authority, "Brande's Dictionary of Science, Literature and Art." Under the head "Hive," we find this subsection:

"*American Box Hives.* The well known circumstance that bees often collect enormous stores of honey when building their combs in a large space (as under the roof of a house) has led to the design of hives of immense size. Some employed in America have been found as large as sentry-boxes. These large boxes are easily stocked by supporting a hive of bees on a few cross-bars placed in the interior, when the bees rapidly extend the combs below the small hive, often completely filling the box. The plan is not so advantageous as might at first appear, as all the combs contain wood and bee-bread, and the honey yielded is consequently always impure, and moreover, is not easily obtained without destroying the bees."

Shades of the lamented Quinby—how is this for a fair representation of the American Box Hive!! This is about on a par with Blyth's "poisonous honey, from the Savannas of New Jersey." See *Honey.*

**Box Honey.**—Comb-honey (q. v.) stored by the bees in boxes.

**Breed.**—*n.* A term applied by stock breeders to races artificially produced and established. It is in this that a breed differs from a *race* (q. v.) and both differ from a *variety* in that they have been so established, either by careful selection and culture in the case of breeds or by long-continued and potent

and natural influences in the case of races, that all danger of "crying-back" (q. v.) is past. Owing, probably to various hitherto insurmountable difficulties in the way of mating, we have no "breeds" of bees; we have *races* and *strains* (q. v.) but no breeds.

**Breed.**—*v.* 1. To raise young. In bee-keeping this is generally called *brood-rearing* or *brood-raising*. See *Raise*.

2. To produce a distinct breed. To do this requires thorough knowledge of the nature of the animals under experiment and careful attention to certain laws which are tolerably well understood as they affect the higher animals, but have not been investigated in the case of insects. But from the fact that scientific apiculture is an art of but a few years growth, we may reasonably hope for as great advances in this direction as has been made in the case of cattle and horses.

For the present, however, we can only follow the laws which have been found to obtain in the breeding of cattle, and await the discoveries which it is hoped that careful experimental investigation will give us.

1. In attempting to establish a new breed or to improve an old one, we must, contrary to the usual opinion, pursue a relentless system of breeding in and in, and it is here that the skill and judgment of the expert breeder will be most fully shown. We have on the one hand the danger of weakening the constitution of our stock, and on the other, the danger of producing a lot of mongrels without any fixed characteristics. The experience of all great cattle breeders has shown that it is only by in and in breeding that the tendency to "cry back" can be eliminated, and these men have also shown that when sufficient care is exercised in the selection of the breeding stock, the danger of weakening the constitution is not to be feared. In this connection it should be remembered that all the well-marked native races of bees must have been produced by a series of in and in breedings, combined with a system of natural selection, which allowed the survival of none but the fittest—all the weak and non-prolific, and all the poor honey-gatherers being killed off during severe seasons. It is the same here as with the great herds of cattle and horses which roam at large in various countries. The most powerful and active bull or stallion obtains the leadership of the herd and breeds in and in with his own cousins, sisters, and even daughters, until one of his progeny, more powerful than he, displaces him in turn. But here we have the weak and feeble calves and foals selected by the forces of nature with better judgment than ever man exercised and killed off by the inclemency of the weather as surely as ever butcher's knife did its work.

2. It will be found that certain males and females have the power to perpetuate their own characteristics in their progeny more powerfully than others. This is a most important factor in any attempt to build up a new breed, or to maintain or improve a

certain strain. We see it marked in the human family where certain men and women have given origin to a long line of representatives which possess marked characteristics. Stock breeders are quite familiar with the fact, and there are certain strains of cattle specially valuable for milk, butter or flesh which owe their origin to some well known cow or bull.

3. It will be found that the influence of the male is in general (not always) more powerful than the influence of the female *provided he is pure bred.* Thus far too little attention has been paid to the character of the drones, though this is not to be wondered at when we consider the great difficulty of the subject. We must remember that it would be almost impossible to select an individual drone as we select a bull from a cattle-herd or a queen from an apiary. It is even difficult to make sure of getting our queens mated with the drones from any given hive, but even in the face of all these difficulties, the importance of the subject must not be forgotten.

There are other points which will readily occur to the scientific breeder. Thus we must not forget that the impregnated female is herself influenced by the male. This has not the same importance with bees that it has with cattle, but how far the impregnation of the queen may influence her drone progeny is a point that cannot bear to be overlooked.

Lastly, the "environment," as evolutionists call it, will, no doubt, have something to do with the production of excellence in any given breed, though less here than in cases where the mother may be trained or worked, as with cattle or horses. Prenatal influences have a wonderful effect on the progeny of mammals, and may it not be that eggs obtained from a queen in the height of her productive power and activity will produce far better breeding stock than eggs from the same queen when her energies are dormant or not fully developed? This brings up the important question of the best age for breeding queens. And does not the quality of the eggs laid by the queen in the early part of the season have quite as much to do with the quality of the queens produced as does the so-called swarming impulse on the part of the workers?

All these questions deserve careful *experimental* consideration. They may be *suggested* by theoretical reasoning but they cannot be *settled* in any such way.

It is in the process of natural selection, however, that the environment will aid us. No stock that has had fair play during the summer and fails to be ready to meet the winter, should be kept for breeding. *We* may feed and keep them for other purposes, but nature would have destroyed them, and we should not attempt to perpetuate them either in the male or female line.

**Breeding "In and In."**—When a queen is fecundated by a drone which is near of kin to her (as brother or cousin), the progeny is said to be the result of breeding "in and in."

**Bridal Trip.**—Wedding flight (q. v.).

**Brimstone.**—*n.* Sulphur. The word literally means *burn stone*, and is applied only to sulphur in the form of solid masses like stones or rolls.

**Brimstone.**—*v.* To expose to the fumes produced by burning sulphur. See *Sulphur*. When used in connection with bee-keeping the word signifies the destruction of a colony for the sake of obtaining their wax and honey.

**Broad Frame.**—See *Wide Frame*.

**Brood.**—Young bees while in the various stages between the egg and the bee which has emerged from the cell. The use of the word *brood* in this connection is very old. Skeat tells us that in Ælfric's Homilies (A.D. 975) speaking of bees, the writer says: "Of tham hunige hi bredath heord brod"—i.e., with the honey they nourish their brood.

**Brooding Bees.**—The nurse bees (q. v.) are so called by some European writers.

**Brood-Cluster.**—The cluster of bees which cover the brood-nest.

**Brood Comb.**—Combs *containing* brood. The term does not apply to empty worker or drone comb which *might* contain brood but does not. Such comb is called either *worker comb* or *drone comb* according as the case may be.

**Brood-Drones.**—Drones in the brood state. See *Egg*.

**Brood Frame.**—A frame of the right width to receive brood-comb.

**Brood-Nest.**—That space in the hive which is occupied by the queen for laying. In fall, winter, and early spring, this space is confined to a small portion of the centre of the hive, and includes the centre space on two or more combs, but in warm weather the queen sometimes lays in combs at some distance from the brood-nest, and even in the boxes arranged for comb honey. But there is always a spot where the rearing of young is specially carried on, and this is the brood-nest.

**Brood-rearing**
**Brood-raising** } The raising of brood. See *Raising*.

**Brood-Workers.**—Worker bees in the condition of brood. See *Egg*.

**Brown Bee.**—The common honey bee; the kind usually kept in box hives. Called also *Black Bee* and *German Bee*. See *Race*.

**Buckwheat Swarm.**—A late swarm produced by the stimulus caused by the great flow of honey obtained from buckwheat.

**Bunt.**—This term properly signifies *smut* or the fungus (Uredo fœtida) which produce disease in grain, but it is also used as a name for the puff-ball (q. v.),

**Cage, Queen.** See *Queen Cage.*

**Candy.**—*n.* This favorite material for feeding bees is prepared by boiling sugar syrup until it is sufficiently condensed. There are three forms depending upon the method of preparation.

1. Sugar candy, so called. This is sugar crystallized by leaving the saturated syrup in a warm place (90° to 100° Fahr.), the shooting of the crystals being promoted by placing sticks, or threads, at small distances from each other in the liquor; it is also deposited from compound syrups, and does not seem to retain much of the foreign substances with which they are loaded. Brown sugar candy is prepared in this way from raw sugar; white sugar, from refined sugar; and red sugar, from a syrup of refined sugar which has been colored red by means of some coloring matter of which cochineal is to be preferred.

2. Boiled candy or barley-sugar (q. v.). This is prepared by boiling the syrup, the several stages of the process being as follows: Well clarified and perfectly transparent syrup is boiled until a "skimmer" dipped into it, and a portion "touched" between the forefinger and thumb, on opening them, is drawn into a small thread, which crystallizes and breaks. This is called a "weak candy height." If boiled again, it will draw into a larger string, and if bladders may be blown through the "drippings" from the ladle, with the mouth, it has acquired the second degree, and is now called "bloom sugar." After still further boiling, it arrives at the state called "feathered sugar." To determine this re-dip the skimmer, and shake it over the pan, then give it a sudden flirt behind, and the sugar will fly off like feathers. The next degree is that of "crackled sugar," in which state the sugar that hangs to a stick dipped into it, and put directly into a pan of cold water, is not dissolved off, but turns hard and snaps. The last stage of preparing this article reduces it to what is called "carmel sugar," proved by dipping a stick first into the sugar, and then into cold water, when, on the moment it touches the latter, it will, if matured, snap like glass. It has now arrived at a "full candy height." Care must be taken throughout that the fire is not too fierce, as, by flaming up against the sides of the pan, it will burn and discolor the sugar, converting a portion of it into caramel which is said to be poison to bees in cold weather; hence the boiling is best conducted by steam heat.

Any flavor or color may be given to the candy by adding the coloring matter to the syrup before boiling it, or the flavoring essences when the process is nearly complete.

For feeding bees the earlier stages are to be preferred as containing more water and as being softer and more easily rasped down.

3. White candy. This is prepared by boiling a strong syrup until it becomes solid on cooling. While still hot the pan is placed in snow or ice water and constantly stirred until the entire contents consolidate into a white mass. Candy in this con-

dition absorbs a large quantity of water and is easily used by the bees. As a winter food we have found it excellent. It may be moulded into cakes or bricks and laid over the cluster, or it may be packed in wired frames and hung by the side of the bees.

4. There is also a preparation which is known as "Good's Candy" or "Sholtz Candy." Langstroth, in his Hive and Honey Bee, gives the following directions for preparing it.

"Rev. M. Scholtz, of Lower Silesia (Europe), recommends the following mixture for feeding bees: "Take one pint of honey and four pounds of powdered lump sugar;* heat the honey, without adding water, and mix it with the sugar, working them together to a stiff doughy mass. When thus thoroughly incorporated, cut it into slices, or form it into cakes or lumps, and wrap them in a piece of coarse linen and place them in the frames. Thin slices, enclosed in linen, may be pushed down between the combs. The plasticity of the mass enables the apiarist to apply the food in any manner he may desire."

**Candy.**—*v.* When honey or sugar crystallize from a solution they are said to *candy*. Candied honey is that which has solidified.

**Cap.**—*n.* 1. When the cover of a hive is made in the form of a box it is sometimes called a *cap*.

2. The cover of a cell—either brood or honey. Sometimes called *the capping*.

**Cap.**—*v.* To cover a cell or seal it over.

**Capped Brood.**—Sealed brood (q. v.).

**Capped Honey.**—Sealed Honey (q. v.).

**Cappings** } The caps of honey cells which are removed when
**Caps** } the honey is extracted.

**Card.**—A frame filled with honey comb. A sheet of honeycomb.

**Carniolan Bee.**—A race of bees found in the mountains of Southwestern Austria. The workers are light grey, and are remarkable for the gentleness of their dispositions. See *Race*.

**Carrier Bees.**—Workers that are old enough to forage.

**Cases for Sections.**—This term is used indiscriminately to denote two distinct devices: 1. Wide frames filled with sections and hung in the hive like ordinary frames.

2. Crates or boxes in which sections are placed and held while on the hive while the bees are filling them, or packed for shipment.

**Cashiered Stocks.**—Stocks of which the bees are either destroyed or united with other stocks.

**Casts.**—This term is usually and properly applied only to

* The sugar must be reduced to *very* fine powder.

"second, third, etc., swarms," but some authors use it to denote any swarm.

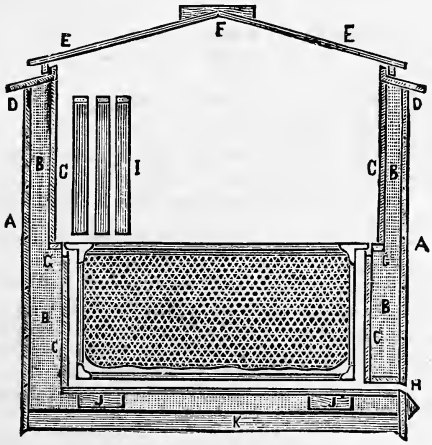
**Caterpillar.**—This term properly applies only to the larva of lepidopterous insects (moths and butterflies). According to some etymologists, it should be applied only to those larvæ that are hairy—the word being literally a hairy she-cat (Old French—*chate pèleuse*). Webster gives *a stealer of food* (*Cater*, food, and *piller*, robber).

**Caucasian Bee.**—A race of bees found amongst the Caucasian Mountains and said to be very active and amiable.

**Cell.**—Literally a small house or room. The compartments of the honey comb in which the bees store honey and raise their young. They are of various sizes and forms—round, pentagonal, hexagonal, etc. See *Comb*, *Queen Cell*, etc.

**Cell, Royal.**—See *Queen Cell.*

**Chaff Hive.**—A hive with double walls, the space between them being filled with chaff or some porous material which will prevent the passage of heat, and consequently will keep the hives warm in winter and cool in summer.




SECTION OF CHAFF HIVE.

A section of one of the most popular forms—the "Simplicity"—is shown in the accompanying engraving where A, A, are the outer sides; C C, the inner walls, and B, B, chaff. H is the entrance, and E, E, a movable cover. It will be seen that this hive is a two-story hive by construction, though of course it

is used as a one-story hive in winter—the upper story being filled with a bag made of any cheap stuff and packed with chaff. A frame of comb is shown in the lower story with its end facing the entrance H, and three frames, I, are shown in the upper story and lying across it.

**Chrysalid** } Plural, chrysalides. A condition into which the
**Chrysalis** } caterpillars of butterflies and moths, and the larvæ of most other insects, pass before they change into the perfect insect. It corresponds to the terms *aurelia, nymph* and *pupa*. At one time it was confined to the lepidopterous insects (insects which have wings covered with powdery scales—butterflies and moths) but is now applied to the pupæ of other insects. The term *pupa* is, however, to be preferred in the case of the bee.

**Clamp.**—1. A movable piece which fastens two or more parts of anything together. Thus we have *clamps* for fastening the bottom board to the hive; for securing the sides of the hives to each other where they are made movable, and for other purposes.

2. A piece of wood or a batten put across a board to strengthen it. Clamps are often nailed to the underside of bottom boards.

3. A number of stocks piled together and covered for winter protection.

4. Frames and boxes piled together and properly arranged so as to be covered with an outer case.

**Cleansing Flight.**—See *Flight, Cleansing.*

**Closed-End Frames.** See *Frames, Closed end.*

**Cluster.**—*v.* Bees are said to cluster when they form a compact mass, each bee holding on to her neighbor by means of the hooks at the ends of the feet.

**Cluster.**—*n.* 1. Any mass of bees which hold together by means of their foot-hooks.

2. When "the cluster" is spoken of, reference is had to the compact mass into which the bees of a colony form themselves when reposing quietly in their hives especially in winter.

**Cocoon.**—The silken case in which the larva of the bee or other insect envelops itself when it passes into the pupa state.

2. When cocoons are spoken off in connection with the apiary, the cocoons of the bee-moth are generally meant.

**Collateral System.**—Placing small hives or boxes at the sides of the main hive or, as Nutt called it, the *Pavilion.*

**Colonizing.**—A method of dividing colonies by inducing them to enter and fill a second hive placed in communication with the original one. Used only with box hives and open to very serious objections.

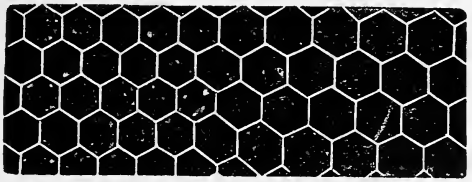
**Colony.**—The bees of a stock. (See Stock.) A complete colony consists of queen, workers, and at certain seasons, drones. The test of a perfect colony seems to be its power of perpetu-

ating itself, and for this the queen and workers are all that is required. We sometimes speak of a *queenless* colony, and the expression is not incorrect, but it is equivalent to saying that the colony is not full or perfect.

The distinction between a *colony* and a *swarm* is simply this: A swarm is a *new* colony just separated from the parent stock. See *Swarm.*

**Colt.**—A name sometimes given to the second after-swarm. The third is called a *filly.* See *Filly.*

**Comb.**—A number of cells built together so as to form a sheet. Comb is always built with cells on both sides, the division between the ends of the cells being called the *septum* and serving as a bottom for both series of cells, thus saving wax. The cells are not placed exactly opposite each other, but the centres of the bottoms are arranged quincunx fashion (see *quincunx*). These bottoms are not flat but concave (as seen from the interior of the cells), being formed of three rhomboidal plates, consequently the cells are a little deeper than just half the thickness of the sheet of comb, which for brood is about 15-16ths of an inch. Such comb weighs about ¼ lb. to the square foot, and it is said to require about 5 lbs. of honey per square foot to make it. Some writers, however, think that the amount of honey used in making wax is greatly over-estimated. As it is more than probable that bees cannot altogether control the production of wax, any more than other secretions, it may be that the waste incurred in the production of comb is not quite as great as has been supposed. When filled and sealed, brood comb weighs about 5 lbs. per square foot, but the cells may be lengthened out so as to hold a much greater quantity. Root says as much as 10 lbs. per square foot. Since honey varies very much in specific gravity (from 1.261 to 1.450. See *Honey*) even when sealed, we must not accept these figures as correct in all cases.



WORKER COMB. DRONE COMB.

Three kinds of comb are found in most hives—worker, drone and store, each being indicated by the cells of which it is formed. The cells of worker comb are shown of actual size in the figure. Five of these cells, placed in line, measure just one

inch, so that each square inch contains 25, and the surface on both sides contains 50 cells. An ordinary Langstroth frame, moderately filled with brood (say a space six inches by eleven) will contain 3,300 young bees, and three such frames will produce about 10,000—a number which constitutes quite a nice little swarm. It is easily seen, therefore, how rapidly weak stocks may be built up during warm weather by giving them occasionally a frame of sealed brood.

The cells of drone comb are much larger—four of them placed side by side measuring one inch or 16 to the square inch.

The depths of both worker and drone cells are the same, but as the caps of the worker cells are flat while those of the drone cells are very considerably convex, the latter really has what is equivalent to a greater depth.

In store comb—that is, comb for storing honey—the cells are often irregular in size and shape. Honey is often stored both in worker and drone cells, but the bees often build comb in corners and out of the way places and use it for storing. Cells for storing honey are generally much deeper than brood cells—sometimes as much as two inches deep and turned up at the ends. See also *Honey-comb*, *Wax*.

**Comb, Artificial.**—All attempts hitherto made to construct comb artificially have failed. We frequently see the article mentioned in the newspapers, but in all such cases the writer draws on his imagination for his facts, and a very poor imagination at that. Thus we have seen it stated dozens of times that comb honey was now manufactured on a large scale by first making comb of paraffine, and then filling it with flavored glucose. It is needless to say that as yet this cannot be done. There is no end to the projects of this kind which might be suggested. Thus we might propose the manufacture of delicate india rubber comb, in which the bees might store honey, and then, instead of passing it through an expensive extractor use a common wringing machine to squeeze out the honey.

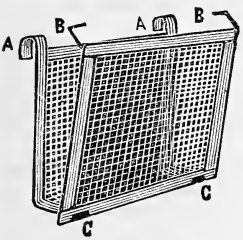
Shortly after the introduction of the movable frame, bee-keepers become deeply impressed with the importance of utilizing old wax in the manufacture of new comb, and various plans for getting the bees to work up old wax were proposed, but none have been successful except what is known as *Foundation* (q. v.). This, however, cannot be called "artificial comb," simply because it is not comb but only foundation.

That bees would use artificial comb for all purposes was very fully shown by that most ingenious apiarist—the late M. Quinby. He constructed comb, with proper sized cells, out of very light sheet metal, and coated it with a very thin layer of wax. A small section of this artificial comb when placed in the brood nest was used by the queen to receive her eggs, and which hatched into larvæ that were duly nursed by the bees, and finally matured. As an experiment, this was a most important step;

but thus far, a really practical article of artificial comb is a thing of the future.

**Comb-Bars.**—Bars or slats to which comb is attached and from which it hangs in the bar-hives.

**Comb Basket.**—That part of the extractor which receives and holds the comb. The term is sometimes used instead of comb box or comb carrier, but this application of it should be avoided.



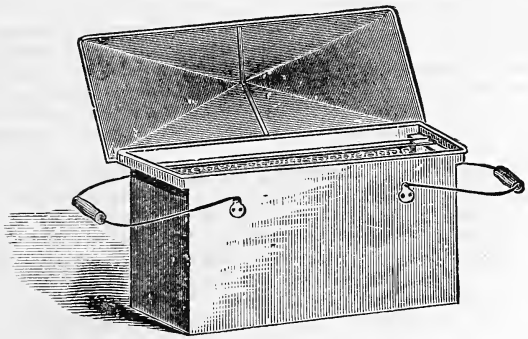

COMB BASKET FOR SMALL PIECES.

A comb basket for small pieces of comb is shown in the engraving.

**Comb Box.**—Another name for comb carrier (q. v.).

**Comb Bucket.**—A comb carrier (q. v.).

**Comb Carrier.**—A box made of such a size as to hold one or more frames of comb so that they may be easily carried about. It should have a close-fitting cover so that the honey shall be protected from flies and robber bees, and the brood from chilling drafts. It may be made of tin or very thin boards—one important point being to have it quite tight. The engraving shows a very neat and convenient article made of tin by Root, of Medina, O.



COMB-CARRIER.

For the confusion of names in regard to this article, see introduction.

**Comb Cutting.**—See *Pruning.*

**Comb Foundation.**—See *Foundation.* This term was sometimes

used by old writers to signify a starter for which, of course, they used natural comb.

**Comb Guide.**—Any arrangement by which the bees are induced to build comb in the exact place that it is wanted. The best comb-guide is a strip of foundation. Before foundation was invented, small pieces of comb were used, and the term was also applied to the edge of the top bar of the frame.

**Comb-Holder.**—A device for supporting a frame of comb after it has been removed from the hive and until the bee-keeper is ready to return it. In some cases the comb-holder is a separate stand, and it is then perhaps more properly called a *comb-stand*

COMB-HOLDER.

or *comb-horse*. The engraving shows a very convenient form of holder which may be hooked over the edge of the hive and which will hold the first frame of comb, so as to give more room in the hive while examining the others.

**Comb Honey.**—Honey in the comb as distinguished from extracted or strained honey.

**Comb Horse.**—See *Comb-Holder*.

**Comb Pruning.**—See *Pruning*.

**Comb Roller.**—A German device for uncapping when extracting. It consists of a roller with short wires projecting from its entire surface. When passed over a comb it breaks the caps of the cells so that the honey is easily thrown out. It is not as good as the knife.

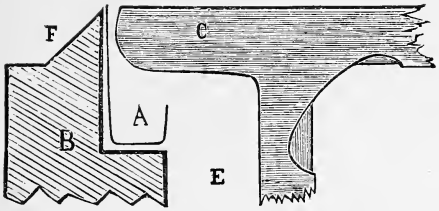
**Comb Stand.**—See *Comb Holder*.

**Condemned Bees.**—Bees that are to be consigned to the brimstone pit.

**Coppet.**—A hackle (q. v.).

**Corbicula.**—Literally, a little basket. The pollen-basket found on the legs of the bee.

**Corners.**—Metal. This term is properly applied to pieces of sheet metal which are fastened to the corners of wooden frames for the purpose of strengthening them. The term has, however, been used to designate pieces of metal which, when applied to the upper corners of the ordinary hanging frames, form the projecting supports from which the rest of the frame hangs. Such so-called corners are shown at c in the figure.




A more appropriate name for these would be metal arms. Metal arms have been constructed in various ways—of wire and of sheet tin. The usual way is to make them of tin, and they are so formed that they may be folded round the corner of the frame so as to hold firmly and present two thin edges by which they rest upon the bearers or rabbets. The advantage of metal corners is that the bees cannot fasten the frames to the rabbets with propolis. The frames are therefore easily set free for examination and do not require to be pried loose. The disadvantages are that the frames move about very easily when the hive is carried. Some very able bee-keepers do not like them on this account.

**Cover Board.**—Honey board.

**Crate.**—A skeleton box for holding sections either on the hive or on their way to market.

**Cross.**—*a.* Irritable; easily made angry.

**Cross.**—*n.* When two races or breeds are bred together the progeny is said to be a *cross.* See *Hybrid.*

**Cross-Mated.**—A queen of any breed which has met a drone of another breed may be said to be *cross-mated.* This term is greatly to be preferred to the word "impurely" mated, which really has no meaning whatever.

**Cross Sticks.**—Sticks, or spleets as they are sometimes called, which are placed in box and straw hives to support the combs.

**Crown Board.**—Honey board.

**Cry Back.**—It is a curious fact, well known to breeders of the higher animals, that the effect of a cross will frequently disappear for several generations and then appear again in a very marked degree. This principle is known to physicians as *Atavism* (q. v.), and amongst breeders of stock such progeny is said to "cry back,"—a term derived from a well known hunting expression. It is therefore never safe to breed from two cross-bred animals. Crossing between pure bred animals is permissible when we intend to use the cross itself or when we intend to breed from it by mating with a pure male or female, but not otherwise.

**Cushion.**—A bag or similar receptacle filled with some porous material which does not conduct heat freely. Cushions are used to protect the bees, and may be used both on top, sides or bottom of the frames. When used at the sides, the form employed is generally called a *division board* (q. v.).

**Cyprian Bee.**—A race of bees found in the Island of Cyprus. They resemble the Italians very closely. Prof. Cook says "they may be distinguished by the bright, leather-colored lunule which tips their thorax posteriorly, and by the fact that the under side of their bodies is yellow to the tip. They are more active than are the Italians, and the queens are more prolific. The good qualities of the Italians seem all to be exaggerated in the Cyprian, except the trait of amiability. The Cyprian bees are second only to the Egyptian in irritability. That they will become less cross with handling is to be expected." See *Race.*

**Dalmatian Bee.**—A race of bees found in Dalmatia. They are slim, wasp-like, and very black, the wings of the abdomen being banded with a light yellow. See *Race.*

**Dead Air-Space.**—See *Air Space, Dead.*

**Decoy Hive.**—A hive properly arranged for the reception of bees and set out in the hope that a swarm will take possession of it. This device is very old, but has never been *generally* successful, although occasionally a swarm will be secured by it. It was described by Markham in his ' Countrie Farm " (1610).

**Deprivation.**—Removing honey from the hives.

**Deserting Colony.**—Colonies frequently leave their hives in a body in fall or spring, when their supplies are exhausted or other conditions are unfavorable. Colonies under such circumstances have been called "Abnormal Swarms" and "Absconding Swarms" (q. v.), but neither of these terms is quite applicable under the circumstances. The term *Deserting Colony* expresses the exact condition of affairs.

**Diarrhœa.**—Generally called Dysentery (q. v.).

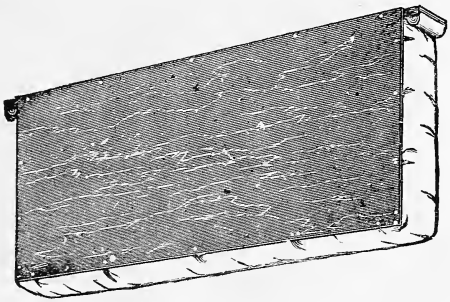
**Dipping Plate.**—A plate of wood or metal which on being dipped in melted wax becomes coated with a thin layer or sheet of this material. This sheet is then peeled off, and after being passed through a proper mill or press is known as comb foundation, or simply as foundation (contracted to f d n).

**Distance Guides** } Pins or blocks attached to the sides of the
**Distance Pins** } top bar of a frame to aid in keeping it in position, and at a proper distance from the others.

**Dividing.**—A method of artificial swarming by dividing a colony.

**Division Board.**—A board used for dividing a hive so as to contract the space in which the colony is kept. They are of two kinds: The plain ones consist simply of a thin board; the chaff

cushion division board consists of a frame about two inches thick, the sides being covered with very thin boards, and the hollow being filled with chaff. The latter are a most excellent device for preventing the escape of heat from the cluster in winter and early spring. Some writers think it is "too much machinery," but we think the advantages greatly overbalance the very slight extra complication. A Chaff Cushion Division Board is shown in the annexed engraving. We believe this contrivance is due to A. I. Root.



CHAFF CUSHION DIVISION BOARD.

**Dollar Queen.**—See *Queen, Dollar.*

**Driving Bees.**—Bees may be caused to leave their combs and hive and pass into an empty box by continued rapping on the sides of the hive. This is often done for the purpose of transferring, making new swarms, etc., and is called driving.

**Drone.**—A male bee.

**Drone Brood.**—The common name for brood which produces drones. More properly termed *brood drones.*

**Drone Comb.**—Comb with cells large enough to contain drone brood.

**Drone Egg.**—An expression generally used to denote those eggs which produce drones. More properly termed *egg drones.*

**Drone Trap.**—A trap for catching drones. It generally consists of a cage of some sort with meshes or wires through which the workers can pass freely, but through which the drones cannot pass. Into this cage the drones are led by a long or crooked passage so that they cannot find their way back. The workers fly off and the drones are kept prisoners.

The modern improvements in hives, and especially the invention of foundation, enable us to control completely the production of drones, and it is better to prevent their being reared than to waste honey in producing them.

Sometimes, however, the bees tear down worker comb and raise drones. They may then be destroyed while in the brood condition. Shaving their heads off is a simple method. Sometimes we wish to remove them after they have emerged; in that case the drone trap is of great use.

**Drumming.**—To rap or beat the sides of a hive for the purpose of alarming the bees and causing them to leave their comb and hive and pass into another receptacle. See *Driving Bees* and *Forcing Swarms.*

**Dummies.**—A term applied by some English writers to division boards. A contraction for *dummy frames.*

**Duplet.**—The hive set over or under another.—*Keys.*

**Duplicate.**—To set one hive over another.

**Dysentery.**—A disease in which bees void large quantities of very soft fæces. Cause and cure are not yet fully understood. Even the nature of the disease is unknown. Some claim that diarrhœa is the proper name for the disease, and probably it is, but the advances thus far made in insect pathology do not warrant us in coming to a decision. It may be, however, that ere long the pathological histology of the bee will be so well understood that this point will be fully decided. In the meantime, there can be no objection to the use of the old word.

**Egg.**—The first condition of the bee after it leaves the body of the mother. When first extruded, and before it has been exposed to the air, the egg has a soft glutinous surface which enables it to adhere to any object which it may touch. The queen places it at the bottom of the cell and it remains as shown in the figure which is considerably magnified.

EGG DEPOSITED IN CELL.

When a colony is in good order all the eggs in the hive are laid by the queen, but it sometimes happens that fertile workers (q. v.) are present, and they too lay eggs. Such eggs are often, and we think not improperly, called *worker eggs.* The queen lays eggs under three different conditions, and capable of producing three different kinds of bees—queens, workers and drones. Such eggs are generally called *queen eggs, worker eggs,* and *drone eggs,* but it is obvious that this mode of expression is faulty. All eggs laid under proper conditions are *queen eggs;* there are no "drone eggs," for drones never lay eggs, and by "worker eggs" may be meant eggs laid by workers. If, however, we regard the word egg in this case as denoting the condition of the bee, we may be enabled to express exactly what we want to say without circumlocution or doubt. The terms *egg queens, egg workers, egg drones,* express the facts precisely. In the case of eggs laid by

workers, which eggs always produce drones, "worker eggs" would be proper, and the expression "worker egg drones" would distinguish them from "queen egg drones."

**Egg Drone.**—A drone in the condition of an egg. An egg which will produce a drone. Such eggs, when queen eggs, are known by being laid in drone cells. Worker eggs (that is, eggs laid by workers) are laid in any kind of cell.

**Egg Queen.**—This is undoubtedly the same as an egg worker.

**Egg Worker.**—A worker in the condition of an egg. Such eggs are always laid by queens, and are really queen eggs.

**Egyptian Bee.**—This bee was at one time regarded as a distinct species and named *apis fasciata*, but it is now generally thought to be a mere variety or race belonging to *apis mellifica*, the common honey bee.

"The German apiarist, Herr Vogel, has given special attention to this variety, and has discovered in it some interesting peculiarities. It never gathers propolis, but uses wax in its place; and it seems proof against the cold. But the most singular fact that has come to his knowledge is, that there exist regularly in an Egyptian colony some twelve or so small drone-laying queens, which would be called fertile workers but that they have a distinctive appearance, consisting in the waxen yellow of their breasts—a feature which is possessed also by the drones of their progeny."—*Neighbour.*

Under these conditions it will be interesting to study the question of hybridity in connection with this bee, and we have made arrangements to do so.

Prof. Cook says of these bees: "They are very yellow, intensely cross, and frequently have fertile workers. They are probably the bees that are famous in history, as having been moved up and down the Nile in rude boats or rafts, as the varying periods of nectar-secreting bloom seemed to demand."

**Eke.**—An addition to a hive, making it larger. This term was generally used in connection with the old straw hives or skeps, and by it was meant an additional ring or hoop, the same diameter as the original straw hive, placed under the old hive. Neighbour defines *eke* as half a hive placed below the main hive, while a whole hive used in the same way is called a "nadir" (q. v.). We believe, however, that any addition to the old straw hive was called an "eke," which merely signifies an addition.

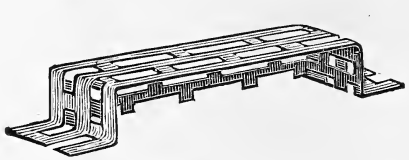
**Emerging Bees** } Young bees just leaving the cells in which
**Emerging Brood** } they were raised. The term *hatching brood* is frequently but improperly applied to young bees in this condition. See *Hatch.*

**Engraft.**—A queen cell is said to be *engrafted* when it is taken from one comb and so arranged in another that the bees fasten it properly.

**Entrance.**—The opening or passage through which bees enter and leave the hive.

**Entrance Blocks.**—Blocks by means of which the entrance to a hive may be regulated as to size and position.

**Entrance Guard.**—A device by means of which queens and drones are prevented from entering or leaving the hive while the workers have free passage. This is accomplished by fastening in front of the usual entrance a strip of wood or metal, pierced with holes which are just large enough to admit a



JONES' ENTRANCE GUARD.

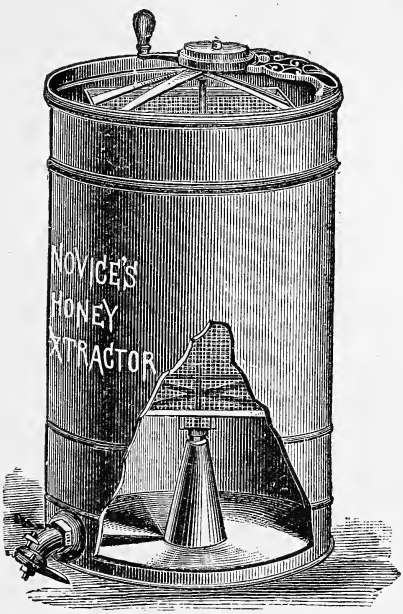
worker, but too small to allow a queen or drone to pass. A very excellent form of this device is that shown in the figure and known as Jones' Entrance Guard. It is made of zinc, the openings in which do not change by being alternately wet and dry.

**Extractor.**—A machine by means of which the honey is thrown out of the cells by centrifugal force. The honey is collected in suitable vessels and the combs, quite uninjured are returned to the hive. A very good form of this machine is shown in the figure on the opposite page.

**Extracted Honey.**—Honey that has been taken from the combs by means of the extractor. Prior to the invention of the extractor, honey was obtained in a liquid state by mashing the comb and straining out the honey. Honey obtained in this way from combs taken from the body of the hive (as in the old system of brimstoning) is always contaminated with bee-bread, the animal fluids of larvæ and other impurities. It was called *strained honey* (q.v.), and this term should always be applied to it, while the term *extracted honey* should always be used to denote honey obtained by means of the extractor.

**Farina.**—This word literally means flour, but it has been used occasionally by botanists to signify pollen, and consequently bee-keepers have sometimes used it in the same sense. But in view of the fact that true flour is used by bees as well as true pollen, it would be well to avoid the use of the word farina as a synonym for pollen.

**Fecundate.**—To impregnate. The queen is fecundated during a successful wedding trip. The words *fertile* and *fertilize* are generally used where the words *fecundated* and *fecundate* ought to be employed. See *Fertilize*.




EXTRACTOR.

**Feeder.**—A device for holding bee-food in such a way that the bees can readily take it without being drowned.

**Fertile**
**Fertilize**
**Fertilization**

The use of the words *fertile, fertilize* and *fertilization* as synonyms for *fecundated, fecundate* and *fecundation*, is greatly to be regretted. It is true that the word *fertilization* is used by botanists quite generally to signify the process by which the pollen renders the ovule fertile, and there are a few instances, outside of works on the bee, in which the same word is used to signify the act of fecundating the ovum in animals, but in the latter case its use is exceptional and, in the case of the queen bee, improper; because the word, if used in this sense, has two distinct meanings, and hence confusion is apt to arise. The word *fertile* means fruitful, and a queen bee may be fruitful without having been fecundated. Indeed, we ordinarily speak of fertile workers, which are never fecundated. It is true that in both these cases, drones only are

produced, but this does not alter the case; it would still be impossible to speak of either the queen or worker as *unfruitful*. If, however, we relegate the words under consideration to their proper places, and give them their most usual signification, we shall be able properly to speak of a *fertile* and *fecundated* queen as meaning one that is both fruitful and impregnated. See *Fecundate*. The subject is also discussed in our Introduction.

**Filly.**—A fourth swarm, the third being called a *colt* (q. v.). A colt is a male foal; a filly is a female foal. In this country the term *colt* is applied to the young of the horse without distinction of sex, but this is an Americanism which ought to be carefully avoided by all who appreciate accuracy of language.

**Flight.**—An after swarm or cast.

**Flight, Cleansing.**—When bees issue from the hive to void their fæces, after a long confinement, they are said to take a *cleansing flight*.

**Flight, Marriage**
**Flight, Matrimonial**
**Flight, Wedding**
} When the queen makes an excursion from the hive for the purpose of meeting a drone, she is said to make a marriage flight. Such a flight is said to be *successful* or *unsuccessful* according to obvious circumstances.

**Floor Board.**—The bottom board (q. v.).

**Flour.**—See *Meal*.

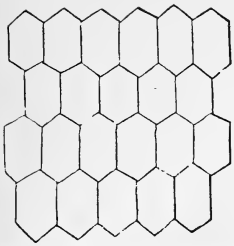
**Forage.**—Bee-food obtained from natural sources.

**Force.**—To drive. See *Driving Bees*.

**Forcing Box.**—A box which is made to fit exactly over a hive so that the bees may be driven into it by the process of drumming (q. v.). In this way artificial swarms are forced, and the bees are sometimes removed from the hive previous to the process of transferring.

**Foul Brood.**—The name of a disease which is undoubtedly the most dangerous to which bees are subject. But little is really known regarding it with any degree of certainty. It is now generally thought to be due to the growth of a microscopic fungus, though this is by no means certain. It affects the brood but not the old bees, and generally gives evidence of its presence by its horrible odor.

**Foundation.**—Sometimes contracted to *f d n*. This term was used by Huish and the older writers to signify guide comb, used to induce the bees to build comb on the slats or bars of the bar-hive. It is now applied exclusively to sheets of wax so stamped as to form an artificial beginning for comb-building. By many it is regarded as one of the three great inventions which have entirely revolutionized bee-keeping, while others, who by no means stand low down in the ranks of bee-keepers,

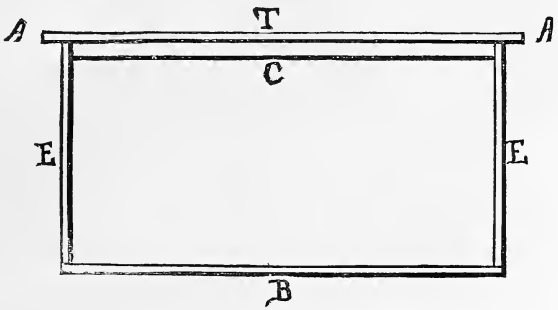


ELONGATED CELLS CAUSED BY THE SAGGING OF FOUNDATION—*From Quinby*,

think that the advantages to be derived from the use of foundation are greatly overestimated.

One of the great objections to the use of foundation is its tendency to sag and thus distort the cells, which in this way are made longer in one direction than in another. This is very well shown in the engraving, where it will be seen that the cells are much larger from top to bottom than from side to side. To prevent this various devices have been employed—the most efficient being either to wire the frames (see *Frame, Wired*) or to insert fine wires in the foundation itself.

**Frame.**—When the word *frame* is used by bee-keepers, without any qualification, it signifies the movable frame in which comb is fastened or built. Frames are usually made of three light strips of wood which, with a stronger one called the top-bar, form a rectangle. The parts of the frame are as follows:




DIFFERENT PARTS OF THE FRAME.

| | | | | | |
|---|---|---|---|---|---|
| Top-bar | shown at | T | in the | engraving. | |
| End-bars | " | " E | " | " | |
| Bottom | " | " B | " | " | |
| Arms | " | " A | " | " | |
| Comb guide | " | " C | " | " | |

The arms are the projecting portions of the top-bar which rest upon the rabbets or bearers. The comb-guide is that portion of the top-bar which projects downwards at C, and serves not only

to strengthen the top-bar, but to secure the sheet of foundation. Before foundation was introduced, bee-keepers relied upon this depending part of the top bar to guide the bees in making straight comb. Hence the term "comb-guide."

There are several very different sizes of frames in use, the following being the dimensions of those most used:

OUTSIDE DIMENSIONS OF THE PRINCIPAL FRAMES IN USE.

*Note.*—These are the outside dimensions in inches of the rectangular part; the arms project at each end $\frac{3}{4}$ of an inch.

| | Length. | Depth. |
|---|---|---|
| Adair | $13\frac{3}{4}$ | $11\frac{1}{4}$ |
| American | 12 | 12 |
| Gallup | $11\frac{1}{4}$ | $11\frac{1}{4}$ |
| Langstroth | $17\frac{3}{8}$ | $9\frac{1}{8}$ |
| Quinby | $18\frac{1}{2}$ | $11\frac{1}{4}$ |
| Quinby frames with closed ends | $19\frac{1}{8}$ | 11 |
| Simplicity | $17\frac{5}{8}$ | $9\frac{1}{8}$ |

Standard of the British Association of Bee-Keepers, 14 inches long by $8\frac{1}{2}$ deep.

**Frame, Brood.**—A frame filled with brood comb.

**Frame, Broad.**—A wide frame for holding sections. It is hung in the hive like any other frame, but the comb being built in sections is easily removed. A better term is *Wide Frame* (q. v.)

**Frame Cover.**—The mat or thin sheet used for covering the tops of the frames for the purpose of keeping the bees down. It is generally made of enamel cloth or duck. Sometimes improperly called a quilt (q. v.). A mat (q. v.) is sometimes used instead of a cloth cover.

**Frame, Hanging.**—A frame made to *hang* in the hive from rabbets or bearers. See *Frame, Standing.*

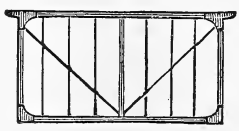
**Frame Holder.**—A stand for holding frames while the bee-keeper is at work.

**Frame, L.**—The Langstroth frame.

**Frame Stand.**—Same as Frame Holder (q. v.).

**Frame, Standing.**—A frame which stands upon the bottom bar instead of hanging from arms resting on rabbets or bearers.

**Frame, Wired.**—A frame in which vertical and diagonal wires are placed so as to prevent either the bottom bar or any comb or foundation that may be in the frame from sagging.



WIRED FRAME.

Wired frames frequently have a stout tin bar placed vertically in the center as shown in the figure. This we dislike on two grounds: 1. We object to any metal in the hive except the very finest wire. Metal is too good a conductor of heat, and carries

away the heat from the cluster too rapidly. 2. Anything that takes up permanently a large space in the centre of the combs is objectionable.

We place a stiff wooden rod between the top bar and the bottom bar when the frame is wired, and as soon as the bees have built out the comb this rod is removed and its place is soon filled with comb.

**Frog-Cheese.**—The puff ball. A large fungus used for smoking bees.

**Fume-Box.**—"The box kept for the purpose of fuming."—*Keys.* Bees were "fumed" or "fumigated" by exposing them to the smoke of the puff-ball (q. v.) which stupefied them to such an extent that they fell from the combs.

**Fume** } *v.* **Fumigate** } *v.* To expose to stupefying fumes. The word is never used in reference to destructive fumes like those of sulphur.

**Fuzz-Ball.**—The puff-ball (q. v.).

**German Bee.**—The common honey-bee; the kind usually kept in box hives. Called also *Black Bee* and *Brown Bee.* See *Race.*

**Glassing.**—Putting glass in sections or honey boxes.

**Glucose.**—This word means *sweet,* and has no relation to the *gluey* or sticky qualities of the substance, as some writers on bee-keeping seem to think. It is a variety of sugar, and its chemical relations will be found in this work *s. v. Sugar.*

Glucose is a natural constituent of the juice, and especially of the nectar of many plants, and as such, it is present in all honey. It is consequently exceedingly difficult to detect it when it is used as an adulterant of this article.

**Glucose, Artificial.**—Artificial glucose is made from starch, the process being to change the chemical constitution of the starch by means of acids, and then remove the acids by means of lime. When moderately well made it contains no starch, as many bee-keepers seem to think, and no dextrine—and these two impurities are easily detected, as are also the sulphuric acid and calcic sulphate (plaster of paris), which are present in very rudely prepared specimens. Glucose can also be prepared from rags and from saw-dust; but when the latter material is used the product is so difficult to purify that it is fit only for the manufacture of the coarser kinds of alcohol used for varnishes, etc.

In commerce, however, *glucose* is a name appropriated to a strong solution of grape sugar, in which the conversion of the starch is not carried quite to completion, and consequently some specimens contain a large proportion of dextrine. The term *grape sugar* is applied to the same compound, further converted, and reduced to a solid condition. Of the nature and characteristics of glucose most writers on bee-

culture have a very confused idea. The editor of one of our prominent bee-journals told his readers recently that it was "a liquid and always a liquid." This is a mistake, as every chemist knows, and we understand that some western manufacturers are now producing crystallized glucose which, in appearance, is almost equal to granulated cane sugar.

It is unnecessary to give any tests for impurities in artificial glucose, as bee-keepers have no use for the article. It is never adulterated; as soon might one carry coals to Newcastle, or sin to the lower regions, as to think of adulterating glucose, which is itself the impersonation of adulteration, and is never used for any other purpose unless, indeed, it be the manufacture of alcohol.

In view of the immense frauds to which the manufacture of glucose gives rise, its production and sale should be strictly regulated by law, if not altogether prohibited. It has lately received the endorsement of the National Academy of Sciences, but then we all know what the endorsement of the scientific men of this country is worth; a glance at the advertisements of the manufacturers of patent articles will give us all the information we need on that point. Pure glucose may be harmless from a physiological point of view—that is to say, it may not be an actual poison—but we must remember that it is never sold at retail under its own name. It cannot be found in open market, offered to the consumer direct. It is used by the confectioner, the syrup manufacturer, the manufacturing grocer, and others, to adulterate their goods, and in every case it is sold for what it is not—that is, for *pure cane sugar*, while it is well known that its actual value, as judged by its sweetening power, is only one-third that of sugar. It is, therefore, a fraud, which tells most heavily against the poorer classes, and yet, to the extension of this fraud, the National Academy of Sciences lends the sanction of its name! Attempts have often been made by bee-keepers to employ glucose (both liquid and solid) as a food for bees. Some have reported fair success; others declare that it is very injurious. Many years ago (1859) the author was impressed with the idea that since glucose or grape sugar is a prominent constituent of honey, it ought to form a good food for bees. He therefore prepared some from potato starch and fed it to a small colony with success; but when made on the small scale, it was altogether too expensive to compete with common sugar. But, since glucose has become an article of commerce, the price is greatly reduced. Under these conditions we have tried it again, both in the pure state and when mixed with cane sugar, but we must confess that, thus far, we have found no economy in its use. We found that colonies fed on it were especially deficient in comb-building power, and our experiments were on a considerable scale. We used hundreds of pounds of glucose carefully tested for purity.

Bee-keepers should never allow it to enter their apiaries under any shape whatever. It will be very difficult to keep it out of

the surplus boxes, and then the bee-keeper lays himself open to a charge of the worst kind of adulteration.

**Good Candy.** See *Candy.*

**Gouged Honey.**—Honey which has been "gouged" out of the top of a "bee gum" after taking off the cover.

**Granulated Honey.**—See *Honey, Granulated.*

**Grape Sugar.**—Known also as *potato sugar, rag sugar, glucose,* etc.

For its chemical relations see *Sugar.*

In commerce the term *grape sugar* is applied to the solid product obtained by slow evaporation from the solution. When in the state of a thick syrup it is known as glucose. See *Glucose* and *Sugar.*

**Gray Bees.**—There seems to be a special strain of bees known throughout the South by this name.

**Green Honey.**—See *Honey, Green.*

**Grub.**—See *Larva.*

**Guide Comb.**—See *Comb, Guide.*

**Gum.**—See *Bee-Gum.*

**Gum.**—This term is sometimes, though very improperly, applied to propolis, which is a true resin. In the "Dictionary of Chemistry," by Watts, one of the highest authorities in this department of science, gum is defined as "a vegetable substance which forms a thick glutinous liquid with water, is insoluble in alcohol, and is converted by nitric acid into oxalic and mucic acids." None of these properties characterize propolis.

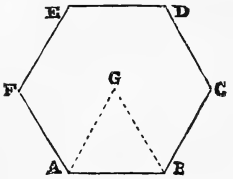
**Hackle.**—The straw covering which used to be set over the conical "skeps" to protect them in winter. Called also a *coppel.*

**Hatch.**—"To produce from eggs by incubation."—*Webster.* To issue from the egg. The word hatch, through all its different meanings, carries the original idea of production from the egg, and any other meaning is only by way of analogy, as "to hatch a plot," etc. It should therefore be confined to this meaning; if we use it, as is commonly done, to express the issuing of the matured bees from the cells, we give it two meanings and introduce confusion. The term, *hatching brood,* therefore, should be used to signify the very young larvæ just issuing from the egg; when we wish to signify brood that has matured and is issuing from the cell, the term *emerging brood* (q. v.) should be used. Our readers must bear in mind, however, that almost all writers fall into this mistake; and by "hatching" brood, mean brood that is just emerging from the cell.

**Hatching Brood** } A term which is properly applied only to
**Hatching Eggs** } larvæ which are just issuing from the egg; eggs which are just hatching. Often improperly applied to brood that is just emerging from the cells. See *Hatch.*

**Heath Bee.**—A race of bees which takes its name from the district known as Luneberg Heath. In form and appearance they are similar to the German Bee, but are very inferior for practical purposes, as they build drone comb, and produce large numbers of drones, even with a young queen, and keep constantly swarming.

**Hexagon.**—A figure having six sides all equal and six angles also equal to each other, as shown in the figure.

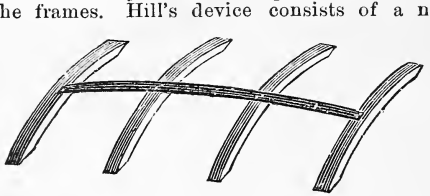


HEXAGON.

The hexagon has the remarkable property that the distance from the centre to any of the angles is precisely equal to one of the sides. Hence, it can be inscribed in a circle by laying off the radius of the circle (the distance from the centre to the circumference) along its circumference.

**Hexagonal.**—Six sided. Most of the cells of which honeycomb is composed are hexagonal. The term *hexagonal* has been improperly applied to what is known as the *quincunx* arrangement (q. v.).

**Hill's Device.**—A contrivance by means of which the bees are enabled to pass *over* the combs, from one to the other, during very cold weather. It is a substitute for winter passages (q. v.), but in our opinion is not equal to them. It has the advantage of not disfiguring the combs, as the winter passages are said to do, though not to our eyes. As well speak of the combs as disfiguring the frames. Hill's device consists of a number of


HILL'S DEVICE.

curved strips of wood nailed to a cross-piece as shown in the figure. When laid on the top of the frames it keeps the cover or quilt up so as to allow the bees to pass under it. The cross piece is often made of iron, a great mistake, since metal is too good a conductor of heat. Wood would be much better.

**Hive.**—*n.* A box or basket in which bees are kept. In the old-fashioned system of bee-keeping the hive consisted of a box, basket, or hollow log, in which the bees lived, and to the sides

of which they attached their combs; where movable frames are used, the hive includes only the outer shell and its appurtenances.

The old sense of *hive* is *house*. Some Germans still call a *bee-hive* a *bee-house*. In practical apiculture the word is never used as synonymous with "swarm" or "colony," though it is sometimes so used in poetry.

**Hive.**—*v.* To cause a swarm of bees to enter a hive.

**Hive, Leaf.**—A hive invented by Huber, in which the frames are hinged together end to end.

**Hiver.**—One who hives bees.

**Hiving.**—The process of removing a swarm of bees from the place where they have clustered to a hive.

**Hiving Basket** } A basket or box used for hiving bees. It is
**Hiving Box** } used to receive the bees from the cluster and carry them to the hive.

**Holyland Bee.**—This name has been given to the bees found in Mount Lebanon, Mount of Olives, Mount Hermon, the Valley of Sharon, Bethlehem, the Hills of Judea, Jerusalem, Jordan, Ammon, East of Jordan, near the desert, Galilee, Damascus, and various other places in that region. Mr. Benton, however, claims that there are, in the countries named, two distinct kinds of bees possessing very different characteristics. These he calls the *Syrian Bee* and the *Palestine Bee*. They will be found described under these heads.

**Honey.**—The nectar of flowers gathered and stored by the bees. This and this alone is true honey. That the bees do effect a change in the nectar is undoubtedly true. Pure cane sugar syrup when fed to bees and stored in comb is no longer cane sugar, though neither can it be called honey. So, too, bees often gather the juice of fruit, honey-dew, molasses from grocer's hogsheads, and other stuff, and store it in their cells, but none of this is honey, even though it has passed through the honey-sac of the bee.*

As might be expected, honey varies greatly in its composition—different varieties being secreted by different plants. The composition also varies with the age of the honey, as a portion of the cane-sugar is gradually converted into inverted sugar by the action of a ferment contained in the honey. Whether this ferment is of animal or vegetable origin is not yet fully settled.

* If the reader wishes to see how far astray our so-called standard dictionaries are in their definitions, let him turn to the words "Honey" and "Propolis." He will be reminded of the famous definition of "crab" propounded t Cuvier by the members of the French Academy, when they were getting up their celebrated dictionary. They thought that they had achieved something wonderful when they had defined "crab" thus: "A red fish that walks backwards." Cuvier complimented them highly upon their ingenuity, and said the definition would be perfect if it were not for three slight defects: In the first place, a crab is not a fish; secondly, it is not red; and thirdly, it does not walk backwards.

Some hold that the ferment is similar to that found in the juice of most fruits; others think that it originates in the alimentary canal of the bee itself. Those who claim a vegetable origin for it, suggest that the bees try to prevent fermentation by the addition of an acid (formic acid?) and by sealing up the cells.

Honey contains four different kinds of sugar: 1, cane-sugar; 2, fruit sugar or glucose; 3, *inverted* sugar (so-called because it turns the plane of polarization to the left or inverts the action of the fruit sugar; 4, a sugar of which but little is known, but which is evidently distinct. Under the action of the peculiar ferment previously mentioned, and which is generally present, the cane sugar gradually changes to sugar of the second and third kinds, and as these are less soluble than cane sugar, the clear, limpid fluid gradually becomes opaque and granular—in other words, the honey is said to granulate.

From this it will be seen that there may be some pure honey which will not granulate, and also, that it would not be so very difficult to produce an imitation or fraudulent honey which would granulate. Therefore, the greatest safeguard which the consumer has against adulteration lies in the reputation of the producer.

The specific gravity of honey varies as widely as its chemical composition. We have seen the bees gather a liquid which was little more than sweetened water, and we have seen the contents of the cells so dense that they solidified before the cells were sealed. The differences in the following data are, no doubt, due to this cause.

SPECIFIC GRAVITY OF HONEY.

| Authority. | Spec. Gravity. | Weight of a Gallon. |
|---|---|---|
| Paris Codex | 1·261 | 10·515 lbs. |
| Duncan | 1·333 | 11·115 " |
| Various works on Natural Philosophy | 1·450 | 12·09 " |
| Our own determination of clover honey extracted after being sealed | 1·370 | 11·507 " |

The gallon is the standard U. S. gallon of 231 cubic inches, holding 8·339 lbs. of pure water.

A cubic inch of water weighs ·0361 lbs; this multiplied by the specific gravity of any sample of honey, will give the weight of a cubic inch of that honey. Thus ·0361 multiplied by 1·370 gives ·04945 lbs. as the weight of a cubic inch of clover honey. This is at the rate of rather less than 21 cubic inches to the pound.

A syrup of the same specific gravity as average honey (1·350) may be prepared by dissolving 7 lbs. of cane sugar in 3 lbs. of water. See *Sugar*.

Honey is adulterated ordinarily by mixing it with glucose or syrup of cheap cane sugar, and adding some flavoring extract.

Since glucose has become so abundant and so cheap, has driven all other adulterants out of the field, and as it is somewhat difficult to detect except by experienced chemists or honey producers, it is very largely used. Hassal names starch, chalk, plaster of Paris, and pipe clay, as chief adulterants, added for the purpose of giving a lighter color to very dark honey. These are easily detected by simply dissolving the honey in hot water and collecting the sediment. Pure honey contains scarcely any sediment. The starch, if unboiled, will fall down with the other impurities. If rendered soluble by boiling, it can still be detected by the blue color produced on the addition of iodine.

Blyth, in his "Dictionary of Hygiene," names, in addition to starch, treacle or molasses, potato sugar (grape sugar and glucose) and syrup.

To consumers of honey, we would say that the only sure way to get a reliable article of honey is to procure it in original packages properly sealed, and bearing the label of some known producer. If such packages are tampered with, the producer undoubtedly has a remedy at common law, and can claim heavy damages from the seller.

The most common form of adulteration, or rather of substitution, is to place a small piece of comb honey in a glass jar and fill up the jar with glucose. The presence of an ounce of comb honey generally serves as a credential for a pound of glucose.

**Honey, Artificial.**—When a substance which is exactly like a natural product, in its chemical and physical properties, is produced by art, we may well give it the name of the natural product with the prefix "artificial." But under no other circumstances can this be justified. Therefore, we have no such thing as *artificial honey.* We have adulterated honey, imitation honey, fraudulent honey, but no artificial honey; for the simple reason, that as yet, we have not been able to produce the article in our laboratories. We can take cane sugar syrup, and by adding a little honey we have something which may be sold for honey, but only by fraud. And so with glucose. If this be added to honey we get a product with all the evil qualities of the adulterant, and with the delicate flavor and stimulating acid of the honey attenuated to the last degree. Such mixtures certainly are not artificial honey, even though they be sold for such. We might just as well call a mixture of milk and water, artificial milk.

To illustrate still further, let us take the case of the diamond: If a manufacturer could crystallize carbon so as to form a gem like the diamond, he would produce something which might be called an artificial diamond, for it would be really and truly *a diamond made by art.* But a piece of heavy glass or, as it is called, paste, cannot be called an artificial diamond, even though it be sold and used as such. It is merely an *imitation* diamond, which is a very different thing.

**Honey-board.**—A board with suitable openings placed over the frames for the purpose of supporting the honey boxes.

**Honey-bag.**—An enlargement of the alimentary canal of the bee in which it carries its load of honey.

**Honey-box.**—A box in which bees store honey apart from the hive.

**Honey-comb.**—This term is applied generally to all the comb in the hive, as every part may at some time or other be used by the bees for storing honey. Some writers, however, use this term to denote comb specially set apart for honey. The cells in such comb are very deep and frequently turned up at the ends. See *Comb*, under which word the reader will find the chief points of practical interest to bee-keepers.

In regard to the etymology of the latter part of the word *honeycomb* lexicographers differ greatly in opinion; Webster and Worcester, *s. v. comb*, give the Anglo-Saxon *combe*, a valley, as the word from which it is derived; Skeat and others derive it from comb—the same word as that used to denote a common toilet article. Skeat say: "The likeness to a comb is fanciful, but there is no doubt about the word." At first sight, merely calling to mind the honeycomb as it comes to table, or as it is seen in improved hives, the likeness is rather fanciful, but if we turn up an old-fashioned skep, and notice the lower edges of the comb projecting below the cluster of bees, the likeness becomes quite obvious, especially to the comb once used by women to keep their hair in place. The word stands alone amongst languages being peculiar to English. The Germans speak of honey-comb as *honig-scheibe*—a "shive" or slice; Swedish, *honingskaka;* Danish, *honning-kage*—honey-cake; Icelandish, *hunangsseimr;* Dutch, *honigzeem*—honey-string; French, *gateau*—cake, and *rayon*—rays.

**Honey-dew.**—The best authorities are agreed that there are two kinds of honey-dew; or, at least, that honey-dew is derived from two very distinct sources. One kind is purely vegetable and is exuded by plants—often to such an extent that it falls on the ground in a shower. The other kind is produced by aphides or plant lice. Bee-keepers are justly very suspicious of honey-dew. It may do, perhaps, for warm-weather food, but it is generally agreed that bees cannot winter well on it, although exceptional cases are recorded.

**Honey Extractor.**—See *Extractor*.

**Honey-gate.**—Since thick honey does not flow freely through the ordinary faucet, bee-keepers have adopted the "molasses-gate" as it is called. When used for honey it is properly called a honey-gate. The pipe, instead of being closed by means of a stop inserted in it, is shut at the end by means of a sliding gate.

**Honey, Granulated.**—After what we have said under the head *Honey*, the reader will readily understand how it is that honey granulates. Granulation, in this case, is a change resulting in crystallization, and the exclusion of the atmosphere serves not only to defer the change, but to prevent to a certain

extent, the subsequent crystallization. It is a curious fact in regard to crystallization that when a strong solution is sealed up while hot, it will remain liquid indefinitely, but if the air be admitted, or if a centre of crystallization be inserted in it, the whole at once assumes the crystalline condition. Take a saturated, boiling solution of alum or glauber salt, contained in a glass bottle or flask, and cork it tightly with a good common cork. If laid aside till cold, it will remain clear and limpid, but the moment the cork is withdrawn, crystals shoot through every part of the liquid, and the whole becomes a crystalline mass. The same is true in the case of honey. If hermetically sealed (in the way fruit and meat is put up in air tight cans) while warm it will remain liquid indefinitely, but if exposed to the air while the temperature is low, it speedily crystallizes. May not this be one reason why the bees so carefully seal their winter stores?

The granulation of honey is a very good test of its purity. Imitation and adulterated honeys rarely granulate. Ignorant persons, however, who are not aware of this fact, are unfortunately apt to regard granulated honey with suspicion.

**Honey-house.**—A house for collecting and keeping honey. It is generally a small building connected with the apiary.

**Honey-knife.**—1. A long thin knife used for separating the combs from the sides of a box-hive. 2. A knife of peculiar shape used for cutting off the caps of the honey cells before the comb is placed in the extractor.

**Honey, Narbonne.**—Honey obtained from the neighborhood of the town of Narbonne in France, in the department of the Aude, 3 miles from the Mediterranean. It is an old town and was known to the Greeks 500 years B. C. For a long period it was a most magnificent city, adorned with temples, triumphal arches and amphitheatres, and famous for the purity and salubrity of its air. Now all its splendor has shrunk into a collection of antiquities, and its only celebrity is its honey, which is considered the best in France, and by some the best in the world. Narbonne honey owes its delicious flavor solely to the abundance of fine honey-bearing plants especially rosemary, which grow in its vicinity.

**Honey-sac.**—See *Honey-bag.*

**Honey Slinger.**—An extractor (q. v.)

**Honey, Virgin.**—That which drains spontaneously from the comb when the cells are uncapped. Some authors claim that stocks which have never swarmed can alone give virgin honey, but this would be to make a distinction without a difference, as the fact of swarming or not swarming makes no difference with the honey.

**Honey Wine.**—Mead (q. v.)

**House Apiary.**—An apiary which is kept in a house specially constructed for the purpose. The hives are reached from the

inside by the apiarist, and the bees pass out and in through suitable holes in the sides.

**House, Honey.**—See *Honey-House.*

**Hungarian Bee.**—A race of the honey bee found in Hungary. See *Race.*

**Hybrid.**—The term hybrid should undoubtedly be applied only to animals whose parents are of different species. When the parents are merely different races or breeds of the same species, the product is more properly termed a *cross* (q. v.) Consequently, unless we decide that the Italian and the common bee are distinct species, the product should be called a cross, and not a hybrid or mule.

One of the special characteristics of hybrids or mules, at least in the higher animals, is that they are sterile or unfertile. Whether this law extends to animals lower in the scale of being, insects, for example, has never been determined so far as we know. Indeed, the bee is the only insect that we can call to mind, to the breeding of which it has ever been attempted to apply generally received principles. The few other insects that are cultivated by man are never, so far as we know, controlled in their mating propensities. One of the most interesting and scientific results to be derived from the introduction of the *Apis Dorsata*, will be the determination of this point: Will the progeny of the *A. Dorsata* and any of the varieties of the *A. Mellifica*, be fertile?

So far as we can at present see, however, the term hybrid, as applied to the progeny of an Italian queen and a black drone, is entirely incorrect. The progeny is merely a cross. Still more absurd is it to call a pure Italian queen, fecundated by a black drone, a hybrid. Such a queen is not even a cross; she is merely cross-mated, or, as it is more commonly called, impurely mated, and the term *cross-mated* should always be used in such cases. There ought certainly to be a limit to the absurdities to which language, even though sanctioned by high authorities, may be allowed to carry us.

**Hybrid Queen.**—See *Queen, Hybrid.*

**Imago.**—The fully developed insect. The last and perfected stage of insect life, when the pupa-case or mask which covered it, is dropped, and the inclosed image or being comes forth.

**Inferior Hive.**—The lowest of a storified set.

**Introducing a Queen.**—When a queenless colony is induced to accept a strange queen, the latter is said to be successfully *introduced.* The conditions upon which depends success in the introduction of a queen are not fully understood. Sometimes a queen may be introduced without any trouble whatever; at other times, the bees cannot be made to accept a queen except by extraordinary methods. It is said that if queens are introduced

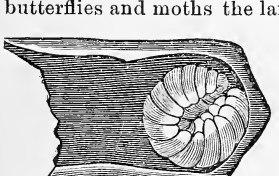
just at dusk, the operation is much more likely to be successful than if the operation be performed earlier in the day.

**Italian Bee.**—A race of bees which seems to have been developed in a province of Northern Italy, north of the Ligurian Gulf, or Gulf of Genoa. This region is shut in by high, snow-capped mountains on the one hand, and the sea on the other. The bees inhabiting it have therefore bred in-and-in, until their characteristics have become fixed and a distinct race has been developed. Spinola called it the *Ligurian Bee*, a name now very generally given to it in Europe.

**Italianizing.**—Changing colonies from any other kind of bee to Italians. This is done by the introduction of an Italian queen.

**Jelly, Royal.**—The food of the larvæ which develop into queens. Its composition is not fully understood. By some it is supposed to be precisely the same as the food upon which the larvæ-workers are reared, the quantity in which it is supplied alone making the difference. Others believe that its composition is entirely different. The subject needs investigation.

**Larva,** Plural *Larvæ.*—An insect in the stage between the egg and the pupa. The word means *masked,* because the true character of the perfect insect is *masked* or *hidden.* In the case of butterflies and moths the larva is also called a caterpillar, and the terms *worm, maggot* and *grub,* are all sometimes applied to the larva of the bee. The term *worm* is decidedly wrong, since the worms are not insects at all. The term *maggot* conveys disgusting associations connected with blow-flies and putrid flesh; the word *grub* is perhaps better, but the best way of all is to adopt the simple word *larva* into the English language. The accompanying engraving shows the larva of the bee in its cell and considerably magnified. For the various stages of the bee in its progress from the egg to the perfect insect, see article *Bee.*



LARVA OF BEE.

**Ligurian Bee.**—The Italian bee. It was accurately and very fully described by Spinola in his "*Insectorum Liguræ species novæ aut variores.*" He found it in Piedmont in 1805. See *Italian Bee* and *Race.*

**Ligurianize.**—To Italianize.

**Late Swarm.**—See *Swarm, Late.*

**Laying Worker.**—See *Worker, Fertile.*

**Leaf Hive.**—See *Hive, Leaf.*

**Long Idea Hives.**—See *New Idea.*

**Lusatian Experiment.**—The raising of queens from egg-workers.

**Lycoperdon.**—There are several species of this fungus, the one generally used for fumigating bees being the *L. giganteum.* It is called *Lycoperdon* (wolf's fart), because when stepped on, it gives a sharp puff and emits a cloud of dust. See *Puff-ball.*

**Maggot.**—See *Larva.*

**Maiden Swarm.**—The first swarm that issues from a stock. By some this term is applied to the first swarm that issues from a swarm of the same season.

**Manifold Hives.**—Hives with numerous compartments which may be used either for one large colony or several of moderate size.

**Manipulation.**—Handling. The words *Handle, Handling,* are greatly to be preferred to *manipulate, manipulation.*

**Marriage-flight.**—Wedding flight.

**Mat.**—A flexible covering for the frames. It may be made of a great variety of materials—cloth, oil-cloth, wooden strips, etc.

**Maturing Brood.**—Brood which is nearly mature; generally applied to emerging brood (q. v.)

**Mel Extractor.**—A honey extractor. *Obsolete.*

**Melipult.**—A honey extractor. *Obsolete.*

**Metal Corners.**—See *Corners, Metal.*

**Micropyle.**—The opening in the egg by means of which the spermatozoon reaches the inside. It corresponds to the opening or foramen of the seed in botany.

**Miller.**—A moth; so-called on account of the dusty stains which it leaves when it rubs against anything, just as does a man who works in a flour mill.

**Mismated.**—Cross-mated.

**Moth.**—This is the popular name of a division of lepidopterous insects, readily distinguished from the butterflies and the sphinges by the form of their antennæ.

The moth which is of special interest to bee-keepers is that known as *Galleria cereana*—the generic name, *Galleria,* being derived from the Latin gallus, a fowl, because the wings when shut together turn up at the ends like the tail of a fowl. The specific name, *cereana,* has been given because it feeds on wax.

The female moth is much larger and darker than the male, and is shown in Fig. 1—copied from the excellent illustrations given by Langstroth.

The male is shown at Fig. 2. The eggs are very small and round, and are shown full size at the left of Fig. 3; those at the right being greatly enlarged. The female lays her eggs on the comb if she can, but quite as often in some crack in the hive where they hatch, and afterwards creep into the inside. Dr.

Fig. 1. FEMALE.

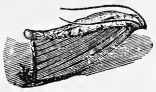


Fig. 2. MALE.

Fig. 3. MOTH EGGS.

Thacher, in his Treatise (1828), suggests that the bees themselves may carry the eggs into the hive on their legs. After a short time the larvæ grow to the size of about an inch and present the appearance shown in Fig. 4.

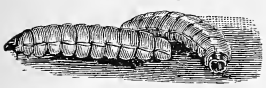


Fig. 4. LARVÆ OF BEE MOTH FULLY GROWN.

They now spin a cocoon, whence they emerge as moths, again to set in motion the round of insect life.

Thacher, Harris and others, give April or May as the earliest period at which the moth makes its appearance. On the 9th of February, 1884, I found two moths in full vigor in a hive in which a queenless colony, upon which I had been experimenting, had died. The hive had been standing out doors all winter, exposed to a temperature of 10° Fah. after the bees died.

Cleanliness, watchfulness, and prompt destruction of every moth, cocoon or larvæ, will be found great aids in keeping these depredators in check. But the most efficient safeguards are strong stocks and Italian bees.

**Moth.**—See *Wax-Moth.*

**Mother Bee.**—See *Queen.*

**Moth Larvæ.**—The larva of the bee-moth.

**Moth-miller.**—An absurd name for a moth. Amongst bee-keepers it is generally employed to denote the moth whose larvæ or young destroy the combs of the honey bee. See *Moth.*

**Moth-trap.**—A trap for catching moths. Also frequently applied to a trap for catching their larvæ. Most traps are useless; if, however, a loose piece of wood be laid on the bottom or against the side of the hive, the larvæ of the moth will creep under it, and may be caught and destroyed. But if such a trap be not attended to, it is worse than useless.

**Moth-worm.**—An improper name for the larva of the bee-moth.

**Movable Frame.**—See *Frame.*

**Moving Bees.**—This term is applied to the transportation of bees from one place to another—sometimes for a few yards, at other times for miles.

**Mully Puff.**—The puff-ball (q. v.)

**Mule.**—The workers have been so-called by some writers. The

term mule is, however, properly applicable only to the progeny of two distinct species, and is synonymous with hybrid (q. v.)

**Nadir.**—The hive which is set under another—*Keys.*

**Nadir-hiving.**—Placing a hive *below* another for the purpose of giving more room. The opposite of *super-hiving* (q. v.)

**Narbonne Honey.**—See *Honey, Narbonne.*

**Nectar.**—The sweet secretion found in the nectaries of plants. Named after the famous drink of the gods.

**Nectary.**—The honey-gland of a flower.

**Neidering.**—Same as Nadir-hiving (q. v.)

**Neuter.**—Workers are frequently but improperly so called. The term is a relic of the days of ignorance in regard to the physiology of the bee.

**New Idea Hives.**—This term has been applied at different times to various systems and devices, but in general, the "new" idea has been an old one after all. The system which came into prominence a few years ago as the "New Idea" consisted in using an unusually large number of frames, all in one story. This, we believe, was the main point, though there were other features which were claimed to be of great importance. From the great length of these hives they came to be called also the "Long Idea Hives." It is needless to say that there was little about this that was new. Langstroth tried it more than a third of a century ago, and we ourselves, prior to the breaking out of the late civil war, had put it in practice. Our experience was, that it was a most excellent system for raising bees, but not a very good one for raising honey.

**Non-swarmer.** 1. A hive so contrived as to prevent the bees from swarming. 2. A colony from which no swarm has come forth.

**Non-swarming Hive.**—A hive so contrived as to prevent swarming. It has not yet been invented, however.

**Normal.**—This word literally means—*by the carpenter's square* being derived from the Latin word *norma*, a carpenter's square. It signifies, "according to established rule or principle"; regular; usual. The word *abnormal* (q. v.) is the opposite, and signifies out of the ordinary course; not according to established principles; exceptional.

**Nucleus,** Plural *Nuclei.*—The plural *nucleuses*, even though sanctioned by Webster, is barbarous. Literally, the kernel of a nut. A centre around which others of the same kind may gather. In bee-keeping it signifies a very small colony of bees which, by care may be increased to a full sized colony. Such small colonies usually consist of one or two frames of comb with a queen or queen-cell, and a few hundred bees. It is astonishing how small a colony will, under favorable circumstances, increase to a full sized one. We have had a colony, so small that it cov-

ered but a small portion of an L frame, increase so that it wintered and became a powerful colony. But the most astonishing case on record is that of Mr. Doolittle, who once had a colony become so reduced, that by actual count there were only 81 bees and the queen, and so they held on till warm weather, when they built up without help, and actually gave a surplus of 5 lbs. on buckwheat, in sections, and were in splendid condition for winter. Such nuclei, however, should not be made to gather stores or build comb. A weak colony cannot build comb in cool weather, even if fed, while a strong colony will build comb with the thermometer below 20° Fah. if they have food. We had 5 lbs. of bees in a box (taken from a box-hive which was to have been brimstoned), and while preparing to get them ready for winter they were fed sugar syrup. As they had a little comb in the box, we gave them what we thought was enough syrup to fill it; but instead of storing it, they used it to build two small sheets of beautiful white comb! The thermometer stood at 18° Fah.

Neither should such small colonies be compelled to go abroad much for stores, except in very warm weather. If fed a little every two or three days they will stay at home and cover their brood, but if compelled to forage, the brood becomes chilled, if the weather is at all cool, the bees get disgusted and desert their hive in a body.

**Nurse Bees**
**Nursing Bees** } It is generally believed that the duty of nursing the brood devolves upon the young bees—those of two weeks old or less. Hence they are called *nurses* or *nursing bees*. Old bees, however, will care for brood, as we have shown, by moving a colony in the evening to a considerable distance from the old stand, and placing its own queen with perfectly empty comb on the old stand. The first time we tried this the bees deserted; the second time they stayed, as we gave them comb into which we had poured honey and also comb with larvæ just hatched. They went to work; the queen laid eggs which in due time matured, and the colony became quite strong.

**Nursery, Lamp.**—This consists of a double-walled hive made of tin. The space between the walls holds a liberal supply of warm water, which is kept at an equable temperature by means of a lamp. When a frame with a sealed queen cell is placed in such a hive or nursery and covered with a thick mat, the queens emerge quite as well as when the cells are left in the hive from which they were taken. Some assert that queens matured in this way are weaker than those that are matured under ordinary circumstances, while others, and those amongst our prominent queen-raisers, claim that there is no difference.

**Nymph**
**Nympha** } An insect in the pupa state.

**Observable Hive**
**Observation Hive**
**Observatory Hive**
**Observer's Hive**
**Observing Hive**

A hive with glass sides, through which the operations of the bees may be observed. Such a hive should contain but one comb, so that the queen may be always in view. When not under observation the glass is covered with wooden panels which exclude the light.

As to which of the above five terms is the best, it would be difficult to say. The second and last are decidedly the worst; number three is the one most commonly used; the first and fourth are the most logical. They have all been used by authors at different times.

**Open-end Frames.**—Frames in which the end bars are so narrow that the edges do not meet when the frames are placed in the hive. There is, consequently, a passage whereby the bees can reach the space between the frames and the sides of the hive or outer case.

**Ovary.**—The organ in which eggs are formed. In the queen bee they are large and fully developed, but in the worker, they are abortive. Sometimes, however, they become so far developed in the latter as to produce eggs, and in that case the bee is called a fertile or laying worker (q. v.)

**Over-stock.**—To keep in any locality more bees than can find a full supply of honey. Some authors doubt the possibility of doing this in any case whatever; but it has been so thoroughly proved, that fifty colonies in most apiaries will gather much more honey per colony than can one hundred, that there can no longer be any doubt in regard to it.

**Oviduct.**—The tube through which the egg passes when it leaves the ovary.

**Palestine Bees.**—The bees found in the southern portion of the Holy Land are said by Mr. Benton to be far inferior to those found beyond the chain of mountains which crosses the northern portion of the country. The latter he calls *Syrian* bees. See *Holyland Bee.*

**Paraffin.**—The substance known as paraffin or paraffine in this country, is a solid, white material, perfectly inodorous and tasteless, somewhat resembling spermaceti. Paraffin is, however, a generic name for a series of compounds which range in consistency from heavy gases to hard solids, and even the substance that we buy and use as paraffin does not possess any chemical individuality, but is probably a mixture of several compounds. In England, the term paraffin, is as frequently applied to the liquid as to a solid form; and consequently, we find frequent references to "paraffin lamps"—something very puzzling to those who are not aware of these facts.

Paraffin possesses an interest to the bee-keeper from the fact that it is frequently used as a means of adulterating wax. It has

even been suggested as a material for foundation—a purpose for which it is totally unfit, as its melting point is only 112° Fah., while that of wax is 145°. The consequence is, that it melts by the heat of the hive, and the entire mass of comb, honey and brood falls down in a disgusting mass of irreparable ruin. For a method of detecting paraffin when used to adulterate wax, see *Wax.*

Paraffin is a most useful substance in its place. It answers equally as well as wax for coating the inside of wooden vessels, and it is used for making beautiful water-proof paper and cloth, which serve to protect articles from dampness or leakage.

Some of the mineral resins or paraffins have a melting point higher than that of the article usually sold, and it has been suggested that they might be used for foundation, but we would strongly advise the bee-keeper to keep everything except pure wax and honey out of the products of his apiary.

**Parasite.**—A plant or animal which obtains nourishment from the body of another plant or animal during the whole or a part of its existence. In the case of animal parasites, when they live in the interior of the animal on whose juices they feed, they are called *entozoa* (singular, *entozoon*); when they live on the outside (as do lice, etc.), they are called *ectozoa* (singular, *ectozoon*); or, *epizoa* (singular, *epizoon*). Animals which merely live with others, eating the food of the latter, and existing only where the host is present, are called *messmates.* The animal which harbors the parasite is called the *host.*

The bee is not seriously troubled with parasites. We have occasionally found it infected with a minute species of *filaria;* bacteria and fungi are often present, and it is supposed that a peculiar species of the latter gives rise to the disease known as foul brood. Of the ectozoa that infest it there are two or three, but they do but little damage to a strong stock.

**Parent Colony** } The colony or stock from which a swarm is-
**Parent Stock** } sues forth.

**Parthenogenesis.**—The production of young by a female without intercourse with the male.

**Pasturage, Bee.**—Plants from which bees procure honey. It is natural or artificial according as it is wild or cultivated.

**Pauper Swarm.**—A deserting colony (q. v.)

**Pavillion.**—The middle hive on the collateral system.

**Piling.**—Placing hives one above the other; storyfying.

**Piper.**—An after-swarm having a virgin queen.

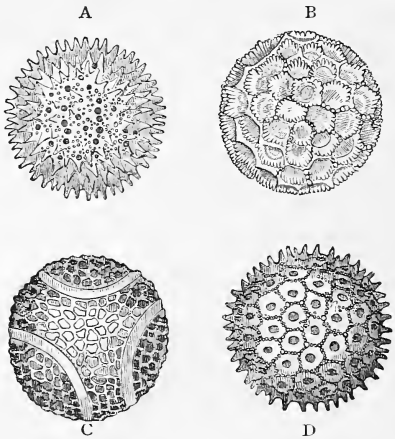
**Piping of Queens.**—A sound made by young queens when there is also in the hive a mature queen, but one not yet emerged from her cell.

**Pissoceros.**—Literally, *pitch-wax.* Modern authors consider it equivalent to propolis. Pliny tells us that it is the second

foundation of the honey-comb, the first being called *commosin* by the experienced, and the third *propolis*.

**Pollen.**—The minute grains which fecundate the ovules contained within the female organs of the plant. It has also been called *farina*, but this term, in this sense, is obsolete. It is not even given in Balfour's Glossary of Botanical Terms. Pollen is also called *bee-bread*, and from a mistaken idea that it was the crude material from which combs are made, it has been called *raw wax*.

Pollen presents a peculiar and characteristic appearance under the microscope, and at one time its presence in honey was regarded as an evidence of the purity of that article. But the purer the honey, the less pollen will there be found in it. The grains of pollen vary with different orders and families of plants, but are constant in form for each species, and even for some genera. A microscope of very moderate power is sufficient to




POLLEN GRAINS.

show their form and markings which are often very beautiful, as will be seen by the accompanying engraving, taken from Carpenter's work on the microscope. The figures in the engraving give a very good idea of the variation in form of different kinds of pollen. That marked A is from the *Althæa rosea;* B is from *Cobæa scandens;* C from Passion flower (*Passiflora Cærulea*), and D from *Ifromœa purpurea.*

**Pollen, Artificial.**—We have not yet succeeded in producing pollen artificially, and it is not likely that we ever shall. The term *artificial pollen*, is therefore a misnomer. But we have good

substitutes for pollen, amongst which are the meals of rye, oats, and wheat. The best, however, is pea-meal. This was to have been expected from its highly nitrogenous character, and practice fully confirms what theory suggests. It is a great mistake, however, to call meal or flour, *artificial pollen.*

**Pollenarious.**—Consisting of meal or pollen.

**Pollen Basket.**—A concavity found on the leg of the worker bee. It is surrounded with stiff hairs which literally form a kind of basket in which the bee packs and carries pollen.

**Portico.**—A porch or covering for the entrance to the hive. It may be made quite ornamental, and if properly designed, may be made to protect the entrance from wind and rain. It leaves a large opening for the bees to strike in the first place, while the passage from the outside of the portico to the narrow entrance of the hive is thoroughly sheltered.

**Prime Swarm.**—A first swarm; one led off by a fecundated queen.

**Princess.**—A young or virgin queen.

**Prize-section.**—See *Section.*

**Propolis.**—A resinous substance collected from various plants by the bees and used by them for fastening movable parts of their hives, filling up cracks, covering offensive matter, and similar purposes. Sometimes improperly called a *gum*, which it is not; the term *bee-gum* is used by some English writers as a name for propolis.

**Prune.**—To cut out old combs so that new may be built. Called by the older writers *gelding.*

**Propolize.**—To cover with propolis.

**Pucks.**—Puff-balls.

**Puff-ball.**—A large fungus, filled with dust when ripe. When thoroughly dried it is used for smoking bees, and is a very powerful narcotic.

A knowledge of this plant and its uses in apiculture came to us from Great Britain, where there are two genera of puff-ball—the *Bovista* and *Lycoperdon*—the latter being the one generally used for stupefying bees by fumigation. The species generally employed is the *Lycoperdon giganteum*, which sometimes attains a size of two feet in diameter, and is, in its earlier stages, of a dirty white color, but becomes brown by age. When quickly crushed (as when trod on) it explodes with a puff and sends out a cloud of dust. Hence the scientific name *Lycoperdon* (q. v.), and also the old English name "wolf's bladder." It had a place in the old pharmacies as a sovereign application for staunching blood, and was also used as tinder in the days before matches, though for both these purposes several species of *Boletus* were more frequently used, and indeed have, even now, a place in the pharmacopœia. When young and pulpy the lycoperdon is

excellent eating, but it deteriorates very rapidly after being gathered, and should be discarded if, when cut, any yellow marks or stains are visible, for then it is too old.

For fumigating bees, they are dried by artificial heat.

Thorley, in his "Melissologia or Female Monarchy," gives the following directions for collecting and using it. "When you have procured one of these pucks put it into a large paper, pressing it down therein to two-thirds or near one-half the bulk, tying it up very close. Put it into an oven some time after the household bread is drawn, letting it continue all night. When it will hold fire it is fit for your use in the method following. With a pair of scissors cut a piece of the puck as large as a hen's egg (better at first to have too much than too little), and fix it to the end of a small stick slit for that purpose, and sharpened at the other end, which place so that it may hang near the middle of an empty hive. This hive you must set with the mouth upwards, near the stock you intend to take, in a pail or bucket. This done, set fire to the puck with a candle, and immediately place the stock of bees over it, tying a cloth round the hives that no smoke may come forth. In a minute's time, or a little more, you will with delight hear them drop like peas into the empty hive. When the major part of them are down, and you hear very few fall, you may beat the top of the hive gently with your hand, to get as many out as you can. Then, loosing the cloth, lift it off to a table, or broad board, prepared on purpose, and knocking the hive against it several times, many more will tumble out, perhaps the queen amongst them, as I have often found. Lodging near the crown, she often retains her hold, and falls one of the last."

**Puffs.**—Puff-balls.

**Punk-fist.**—The puff-ball.

**Pupa.**—A bee in its later stage as sealed brood. During the earlier period of its existence as sealed brood, it is simply a larva—not having spun its cocoon. After the cocoon has been spun it is a pupa, and so remains until it emerges as an *imago* or perfect bee.

PUPA.

The appearance of the pupa when changing its form from that of the larva to that of the fully developed bee, is very well shown in the accompanying figure from Bevan.

The appearance of the bee during the several changes from egg to imago are beautifully shown in Girdwoyn's work—"Anatomie et Physiologie de l'Abeille," Plate XII.

**Pure.**—This may be a contraction for either *pure-bred* or purely mated. It should therefore never be used alone.

**Queen.**—*n.* The mother of all the bees raised under natural conditions in the hive.*

* It is a common practice to transpose the comb, eggs, and brood of different

Although all the workers are females and should not be spoken of as of the masculine gender, as is too commonly done, the queen is the only fully developed female in the hive. Some old writers spoke of her as the "King Bee," and this error survives even to-day amongst some non-progressive bee-keepers.

**Queen.**—*v.* To supply a queen to a colony. To introduce a queen.

**Queen Cage.**—A cage or box for holding a queen during certain operations. Thus it is used for sending queens by mail; for keeping queens temporarily out of the hive; for protecting queens during the process of introducing. It generally consists of a wooden block with a large opening covered with wire gauze.

**Queen Cell.**—A large cell in which a queen is raised. The accompanying engravings from Langstroth give an excellent

Fig. 1.

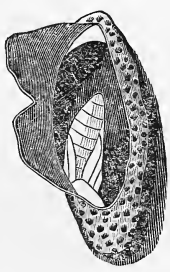


Fig. 2.

QUEEN CELLS.

view of a queen cell. Fig. 1 shows the cell as seen before the queen emerges; Fig. 2 shows the same cell with the side broken away by the engraver, so as to show the royal pupa within.

**Queen, Cross-mated.**—A queen that has been mated with a drone of another race. Generally, but improperly called an *impurely mated* queen. Sometimes, and still more improperly termed, a *hybrid queen.*

**Queen, Dollar.**—A term used to denote an untested queen, bred from a purely bred mother that has mated with one of her own race. So-called, because the standard price was supposed to be one dollar. Strange to say, however, the price of "dollar" queens varies from 75 cents to $2. The term, therefore, looks very much like a misnomer.

**Queen, Hybrid.**—An improper name for a queen whose

hives, and consequently, the progeny of a pure Italian queen is often raised in a colony of blacks; but this is an artificial, not a natural condition. The presence of fertile workers is also an abnormal condition,

mother had been cross-mated. Thus far, we have no evidence that we have any hybrid bees (see *Hybrid*), but if we use the word "hybrid" instead of the more appropriate term, "cross bred," then a hybrid queen is one that is produced from the eggs of a cross-mated queen. But to complicate and confuse matters still more, the term *hybrid* is applied by many writers, and in almost all the trade circulars, to pure-bred queens which are cross-mated. Such queens are not even *crosses* let alone *hybrids*.

**Queen, Impurely Mated.**—A queen that has met a drone of another race is said to be "impurely mated." We prefer the term "cross-mated."

**Queenless.**—Having no queen.

**Queen Raising** } The process of developing queens from the
**Queen Rearing** } egg or larva. See *Raising*.

**Queen, Tested.**—A queen whose progeny has been examined and found to be pure-bred. Consequently, the queen must be pure, and not cross-mated. By *pure* is meant that she is of some well-defined race, such as the Black bee, the Italian bee, the Cyprian bee, etc. It may seem strange to talk of a *tested* black queen, but it is perfectly proper to do so, and might be necessary.

**Queen, Virgin.**—A queen which has not met a drone; an unimpregnated queen; an unfecundated queen.

**Queen, Warranted.**—A queen which has not been tested (see *Queen, tested*), but which the seller agrees to replace if it should prove that her progeny are not pure-bred.

**Queen-yard.**—This was a device of the late Mr. Quinby and was intended to prevent the loss of queens with clipped wings when they attempted to lead off a swarm. It consisted of a small "yard" lined with tin, and with a smooth tin ledge which projected internally so as to prevent the queen from crawling out. Its use has been abandoned; one reason being that a number of bees would often cluster in one corner of the yard, and the queen would escape by crawling through this cluster.

**Quilt.**—A device for preventing the escape of heat from the brood-cluster. The arrangement most frequently used consists of two thicknesses of cloth with some porous material between them and the whole "quilted" together. This has the great advantage that the whole can be lifted off at once, but, on the other hand, we have found that when coated with propolis, wax, etc., such quilts become so stiff and creased that it is impossible to make them lie flat on the frames; bees, therefore, escape, annoy the operator, and in cold weather die, because they cannot find their way back to the cluster. We prefer, therefore, to cover the frames with a thin, tough sheet (enamel cloth in summer, duck in winter), and lay the quilt on this. In this way, any old cloth or carpet makes a most excellent quilt when cut to the proper size.

**Quincunx.**—This word is derived from the five marks on a five ounce weight, and signifies an arrangement in fives, this being the least number that will exhibit the system, the special feature of which is that the objects stand in straight rows in four different directions, so that if they were trees or other plants, a cultivator might be run between them on four different lines. If it be desired to get the greatest number of plants on a given area, and still keep them the greatest possible distance apart from each other in every direction, the quincunx system enables us to do it. The objects may be arranged as in the accompanying figure, where it will be seen that they form rows,

the objects in the alternate rows "breaking joint" with those in the others, and the rows being placed at such a distance apart that the distances between any object and those lying around it are all equal.

The quincunx arrangement has been strongly recommended for the hives in an apiary, and it serves admirably. It has been sometimes improperly called the *hexagonal* system, from the fact that each hive is surrounded by six others, all at equal distances from it and from each other. The system is a very old one, and it would be a pity to introduce a new and inaccurate name for it.

**Rabbet.**—When one part of the edge of a piece of wood is planed lower than the rest, the lower part is called a *rabbet* or *rebate*. In Fig. 1, R is the rabbet, and upon this lower portion the arms of the frames rest, so that their upper surface may not project above the walls of the hive; otherwise, the bees would get out here and cause annoyance.

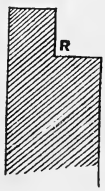



Fig. 1.

Strange to say, the term rabbet has been "lately applied to a strip of folded tin, to be used in any hive where the frames are suspended by the top bar." In Fig. 2 the folded tin strip, A, will be seen resting on the rabbet as just defined. It will be seen that the edge of the tin upon which the arm rests is just the reverse of a rabbet, and to call it a rabbet is an absurdity. It should be called a *support*, bearer, or some similar name, but

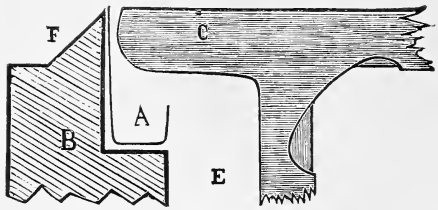



Fig. 2.

certainly not a rabbet. Some English writers call it a *runner*, but we prefer the word *support* in such cases. See *Support*.

**Race.**—The term "race," in the sense of *kind*, is used to denote a variety which, by long exposure to peculiar influences and conditions, has lost the tendency to recur to the original type. A *race* differs from a *breed* (q. v.), in that it has been produced by natural means; and from a *variety* in that it has endured longer, and has become more permanent. Our most scientific bee-keepers acknowledge quite a number of distinct races of bees, amongst which may be named the *Black*, *Brown* or *German* Bee; the Carniolan; the Caucasian; the Cyprian; the Dalmatian; the Egyptian; the Holyland, Syrian, or Palestine; the Hungarian; the Italian or Ligurian, for a short description of all which, see under these several heads. In the case of some of these—notably the Italians and the Cyprians, the race has been hemmed in for hundreds, perhaps thousands of years, by a wide extent of sea, or by mountain tops whose snow-clad summits were an effectual barrier to the passage alike of the queens, drones, and swarms of other races.

**Rack.**—*n.* 1. This word was originally used to signify the grating placed above a manger for holding hay; Bailey defines it as "a wooden frame to hold fodder for cattle, or to put bottles in." In bee-keeping the term *honey rack* is the name of an open framework or crate placed upon the brood frames for the purpose of holding sections or honey-boxes. 2. The term rack is also used in mechanics to signify a straight bar with teeth or projections. Hence it has been applied to a bar having notches and fastened to the bottom of the hive for the purpose of keeping the frames the proper distance apart. Used with very deep frames and when moving stocks.

**Rack.**—*v.* To draw off clear liquid from sediment.

**Raise** } Both these erms are properly applied to the producing
**Rear** } and bringing up of young animals. Webster defines *raise* thus: "To cause to grow; to procure to be produced, bred, or propagated." *Rear* he defines thus: "To bring up or to raise to maturity." *Queen-raising* and *queen-rearing* are both proper.

Worcester, and other authorities, give substantially the same definitions. The best etymological authorities agree that the words are originally the same. They may, therefore, be used interchangeably.

**Raw Wax.**—A name given by some old writers to pollen. It is founded on the erroneous idea that bees *collect* wax.

**Rebate.**—See *Rabbet.*

**Rectangle.**—A figure in which *all* the angles are right angles. It must therefore be four-sided. The sides, however, need not be all equal. The opposite sides must be equal. A rectangle is not necessarily oblong; it may be a square, for every square is a rectangle, though every rectangle is not a square.

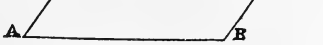
RECTANGLE.

**Re-hive.**—We would suggest the more general use of this word to signify the transposing of frames and bees from one hive to another where the combs are not cut out, and put in new frames. We need such a word to signify the minor operation of transposing from the more important one of transferring, and the expression, *re-hiving*, seems to us to meet the case. See *Transfer.*

**Render Wax, To.**—To melt and clarify it. This is best done in the Wax Extractor, but may be done in a common pot or kettle. See *Wax.*

**Rhomb.**—A four-sided figure whose sides are all equal and the opposite sides parallel to each other, but whose angles are unequal, two of the angles being obtuse and two acute.

RHOMB.



RHOMBOID.

**Rhomboid.**—A four-sided figure whose opposite sides and angles are equal, but which is neither equilateral nor equiangular. The difference between a rhomb and a rhomboid will be readily seen on examination of the figures.

**Ripe Honey.**—Honey that has been evaporated either in the hive or otherwise, so as to keep without souring. When fully ripe it is capped or sealed (q. v.)

**Rob.**—When one colony takes the honey of another it is said to rob it.

**Royal Cell.**—See *Queen Cell.*

**Royal Jelly.**—See *Jelly.*

**Sandarach.**—An old name for pollen or bee-bread. *Improper.*

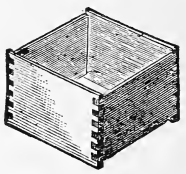
**Scout.**—It is a general belief that bees, when about to swarm, send out scouts to find a suitable location for the future hive. This is doubted by some, but the meaning of the word is as we give it.

**Seal.**—To close a cell by means of a cap of wax, or of wax and pollen; an operation performed by the bees.

**Sealed Brood.**—When the larvæ reach a certain stage of development, the cells in which they have been raised are sealed by the bees. The brood remains in this sealed condition until it emerges as a fully developed bee, and during this period is called "sealed brood."

**Sealed Honey.**—As soon as honey is fully ripe the bees cap or seal up the cells in which it is contained. It is then called sealed honey.

**Section**
**Section Box** } A small frame, closed on top, bottom and ends, in which the bees are made to store honey. The one-pound section is $4\frac{1}{4} \times 4\frac{1}{4}$ inches. The two-pound section (or so-called Prize Section) is $5\frac{1}{4} \times 6\frac{1}{4}$. The thickness or width varies from $1\frac{1}{2}$ inches to 2 inches.



DOVE-TAILED SECTION BOX.

**Separator.**—A piece of wood or metal placed between the sections for the purpose of preventing the queen from entering them and laying eggs; and also for the purpose of preventing the bees from building the comb beyond the sides of the section.

**Septum.** A division. Generally applied to the vertical division between the two series of cells in the comb—that is the bottoms of the cells.

**Sheet.**—A cloth covering for the frames in a hive. While a *quilt* is generally made of two thicknesses of cloth with some porous material between them, a *sheet* is properly but one thickness. The sheet is used chiefly for the purpose of preventing the bees from passing above the frames; the more clumsy quilt is used for preventing the escape of heat from the brood cluster. See *Frame Cover*, *Quilt* and *Mat.*

**Sholtz Candy.**—See *Candy.*

**Side Bar.**—A name given by some English writers to the end-bars of the frames. The term "side" bar is decidedly incorrect.

**Side Boxes.**—Honey boxes placed at the sides of the frames of comb, or at the sides of the hive, in distinction from those boxes which are placed on the top of the hive. The term is not

often applied to sections or boxes hung at the sides of the frames in the brood cluster, but it is difficult to draw the line.

**Skep** } This word literally means a basket. In some coun-
**Skip** } tries the bees are hived in baskets lined with straw. The term, as used in bee-keeping, applies properly to the old-fashioned straw hive and similar contrivances, and not to box or similar hives.

**Small Hive.**—A term applied by some English writers to the cap or super.

**Smoke.**—Since the bee-keeper has occasion to use this term frequently, it is well to get at its true meaning, so that we may use the words *smoke* (*v*); *smoke* (*n*), *fume*, fumigate, etc., in their proper senses. The definition given by Webster, and followed by the Imperial Dictionary, is so thoroughly wrong that it cannot be defended either for scientific reasons, or upon the ground of good usage. His definition is: "The exhalation, visible vapor or substance that escapes or is expelled from a burning body." To this he adds: "Applied especially to the volatile matter expelled from vegetable matter, or wood, coal, peat, and the like, the matter expelled from metallic substances being more generally called fume, or fumes."

"Vapor" he defines: "Any substance in the gaseous or aeriform state, the condition of which is ordinarily that of a liquid or solid."

Now, the essential peculiarity of smoke is, that it consists not of gases or vapors alone, but of gases or vapors, or both, loaded with finely divided solid matter. In the case of ordinary smoke used by bee-keepers, it consists of the gaseous products of combustion (carbonic acid, carbonic oxide, etc.) and the vapors of water, pyroligneous acid, etc., loaded with finely divided carbon and the partially condensed vapors of imperfect combustion. Smoke, therefore, is simply the gaseous products of combustion loaded with finely divided solid matter. The smoke of a soft-coal furnace is black; that of a magnesium lamp is white. The definition given by Worcester agrees with these obvious facts, and is correct.

On the other hand, the term *fumes*, does not apply especially to mineral matter, as Webster states. We speak (and properly too) of "the fumes of tobacco;" "the fumes of whiskey," and the word "fumigation," as applied to the exposure of bees to the vapors arising from the slow combustion of puff-ball, has long been an accepted term. The word "fumes" applies to purely vaporous exhalations, whether vegetable or mineral, and, although originally meaning the same thing as *smoke*, it has now come to have a slightly different meaning, so that we very properly make a distinction between the *fumes* of tobacco and the *smoke* of tobacco.

Since sulphur, when burned, gives off only fumes, it is proper to speak of fumigating bees with sulphur; in that case, we should not speak of smoking them. In the case of puff-ball,

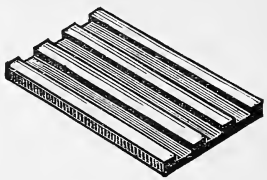
the active agent seems to be a volatile narcotic, and in this case too, the term "fumigate" is proper, even although the fumes may be accompanied with smoke.

**Smoke.**—*v.* To direct a blast of smoke on bees for the purpose of subduing or controlling them.

**Smoker.**—An implement consisting of a small furnace in which rotten wood, rags, or similar materials are burned. The smoke from this slow combustion is blown on the bees by means of a pair of bellows which is generally attached.

**Smyrnian Bee.**—A race of bees found in Western Asia. Said to be quite distinct and very excellent.

**Spacing Board.**—A board with grooves into which the end-bars or bottom-bars of the frames slide and are held firmly at the right distances apart. They are used when hives with movable frames are transported from place to place.



SPACING BOARD.

**Spat.**—Unsealed brood. This word is properly applied to the young of the oyster and similar shell-fish. It is not a desirable substitute for the word *brood.*

**Species.**—To give a good definition of *species,* is a problem that has taxed the powers of the ablest scientists. Fortunately, for our purpose, all questions of origin, etc., may be safely disregarded, and our task is, therefore, so much the easier.

Buffon defines a species as "a constant succession of individuals, similar to and capable of reproducing each other." Cuvier's definition is: "A succession of individuals which reproduces and perpetuates itself." In both cases, the power to produce fertile offspring is a prominent feature of the definition. The main question of course is: How far may a series of individuals depart from the main type and still belong to the species?

The fertility of the progeny has frequently been proposed as a test of difference in species; but, even with such an apparently simple and crucial test, it is not always easy to decide. Some kinds interbreed with much more facility than others, even when their apparent differences are much greater. Thus, it has been found that wild and tame geese, when bred together, produce a veritable mule which is unfertile, while the dog and the jackal, which are apparently much less nearly related, breed together freely, and the progeny is fertile.

So far as bees are concerned, it is believed by the best authorities that all the kinds at present under domestication are mere varieties of one species. Even difference of habit to the extent of using wax for propolis, as is the character of the Egyptian bee—*Apis fasciata*—does not indicate a difference of species, for it is on record that the common honey bee has done the same

thing when propolis could not be had, so that before coming to a decision, it would be at least necessary to determine whether or not the Egyptian bee has easy access to propolis.

For a list of species see *Apis;* the principal races are named under the head *Bee*, and the extent of the variation which exists among them under the heads *Breeding, Strain, Variety.*

**Spent Queen.**—A queen whose productive energies have been exhausted.

**Spermatozoon.**—Plural *Spermatozoa.*—An essential peculiarity of the spermatic fluid of all animals, consists in the presence of elongated bodies which have active motion, even for some time after they have quitted the living organism. From this they have been regarded by many as animalcules, but this is an error. They are, undoubtedly, true products of the formative action of the organs in which they are found, and cannot be ranked in the same category with Animalcules proper. In all the higher animals, impregnation takes place from the union of one or more spermatozoa with the ovum of the female, and in most cases connection between the male and female is necessary for each birth. In the birds, however—notably the turkey—one impregnation lasts for several eggs, and in some of the insect families—notably the ants and bees—one impregnation lasts perhaps, for a lifetime. In these cases the males produce a large quantity of very concentrated semen which is received by the female in a small sac and kept there till wanted. See *Spermatheca.*

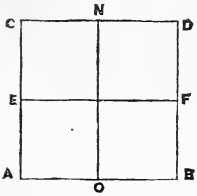
**Spermatozoid.**—This term was first used in botany to designate the moving filaments contained in the antheridia of cryptogams. It has since been used by Flint and other writers to designate what are usually called *spermatozoa* (q. v.); the object in using this word probably being to avoid any appearance of sanctioning the idea that spermatozoa are animalcules. But, on the ground that the word *spermatozoid* has been appropriated by botanists to denote a specific object, we prefer the word *spermatozoon.* Etymologically, the objection named above applies equally to both words, but it seems to us to be of no importance. The plural of *spermatozoid* is *spermatozoids*, not *spermatozoa*, as some have it.

**Spermatheca.**—A small sac which is attached to the oviduct and receives the spermatic fluid of the drone in the act of copulation. In virgin queens it is empty, but after impregnation it is well filled. It is supposed, that when the egg, in passing through the oviduct, comes opposite the opening of the duct from the spermatheca, one or two spermatozoa are ejected so as to impregnate it. The spermatheca is quite small—just clearly visible to the naked eye—and yet it has been estimated by Leuckart, that it may contain 25,000,000 spermatozoa.

**Spring Dwindling.**—In many colonies the bees die off in spring faster than the young are matured. The colony, consequently, *dwindles*, and sometimes disappears altogether. The

cause of this disastrous state of things has been frequently discussed, but no satifactory conclusion has been reached. In our own practice we have sought to avoid spring dwindling: 1. By economizing to the utmost the natural heat of the bees. This we do by contracting the brood nest as much as possible, and surrounding it with non-conducting material in the shape of cushions and division boards. Also lessen ventilation as much as possible. 2. By supplying good wholesome food—preferably sugar syrup, for the saccharine portion. 3. By taking great care that the queen is never exposed to a low temperature. This can only be accomplished by keeping the whole colony warm. If the whole colony gets chilled, and the heat of the cluster falls, so that the queen gets chilled, it takes her a long time to recover, though she may eventually do so, and again become useful. 4. By having plenty of young but well-matured bees in the fall. Young bees which have not had several good flights are worse than useless.

The great remedy for all troubles, however, is to have strong colonies with plenty of food.



A SQUARE.

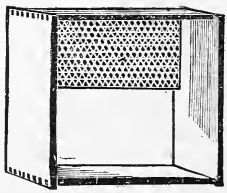
**Square.**—A figure which has all its sides equal, and all its angles right angles. The figure A, B, D, C, is a square. A square is a rectangle, but a rectangle is not necessarily a square. See *Rectangle.*

**Stall.**—An old term for a stock (q. v.); more properly, merely the stand. *Obsolete.*

**Stand.**—The base or support upon which the hive stands; also, the location of a colony. The word is used improperly for stock, colony and hive. See *Stock.*

**Stand, Bee.**—This term is sometimes used as synonymous with apiary, but should not be used in this sense.

**Starter.**—A small piece of comb or foundation put into a frame or section to "start" the bees comb-building in the right direction. A section with a "starter" of foundation is shown in the figure.


SECTION WITH STARTER.

**Sterile Queen.**—A queen that does not lay. Sometimes queens lay eggs that will not hatch. In this case the queen can scarcely be said to be barren or sterile, though the eggs are properly called *unfertile.*

**Sting.**—The weapon by means of which bees defend themselves.

**Stock.**—This term can scarcely be dispensed with, although it

does not find a place in some glossaries, and other writers consider it synonymous with *colony*, which it certainly is not. A colony is simply the bees of any stock, whether a new swarm or the inhabitants of a hive that has been established for years. Then we have the *hive*, which certainly does not include a colony, just as a colony does not necessarily include a hive.* A stock, however, includes colony, hive, comb, stores, and all that is necessary for the normal existence of the bees. (Sections, crates, smokers, etc., may be necessary for the bee-keeper, but not for the bees, and consequently cannot be included.)

**Stock Hive.**—A term sometimes used to denote the hive or apartment in which the brood, etc., exists, as distinguished from the "Super" or honey-gathering apartment.

**Stopped.**—Capped (applied to cells containing honey).

**Stop-wax.**—Propolis.

**Storify.**—To range hives over or under each other.

**Strain.**—This word, though characterized by Webster as obsolete and rare, is one of the most useful, expressive, and legitimate words that we have, and this is shown by the extraordinary difficulty of finding a synonyme for it. When we speak of a *strain* of bees we mean a *series* of carefully selected individuals which have not been erected into a breed, but, nevertheless, show certain peculiarities which distinguish them from bees bred promiscuously. The word finds its proper place in the following sequence:

$$\text{Genus—Species—}\left\{\begin{matrix}\text{Variety}\\\text{Race}\\\text{Breed}\end{matrix}\right\}\text{—Strain.}$$

Amongst stock breeders the word is in common use, and amongst certain very distinct breeds we have *strains* which are noted for certain peculiarities, although these peculiarities do not constitute a sufficient difference to make a new breed. Thus, we have certain strains of particular breeds of cattle, which strains are noted for large quantities of milk, while other strains of the same breed are noted for their butter-giving qualities. And so, too, with bees; of the same race we may have different strains—some noted for gentleness, some for great working power, some as being good nurses, some as wintering well, some as combining several good features.

**Strained Honey.**—This term would properly apply to filtered or clarified honey, but it is generally used to denote honey that has been obtained from the combs by squeezing. It frequently contains the juices of young bees, bee-bread, etc., etc.

**Sugar.**—Sugar being the main constituent of honey and the chief food of the bee, possesses special interest for the bee-

* Dealers and bee-keepers speak of sending "colonies" in packing boxes. In such instances they certainly do not include the hives.

keeper. Under the heads *Candy, Glucose* and *Honey,* the reader will find interesting and useful information in regard to the subject. The different kinds of sugar which enter into the composition of honey are named under the head *Honey,* and possess much interest to the scientific inquirer; but, with the exception of cane sugar, which is used so largely for feeding bees, and glucose (natural and artificial), it would at present be difficult to turn this knowledge to practical account. The reader who is curious on the subject will find a very complete resumé of our knowledge in regard to it in the "Dictionary of Chemistry," by Watts. A few of the chief facts in regard to cane sugar may be of value here.

The term, "sugar," is generally applied to the product obtained from the cane and the beet, and from the fact that it was first largely obtained from the cane, it is now generally known as *cane sugar.* It is found not only in the sugar cane and the beet root, but in the maple and in numerous other plants. The juices of many grasses* contain it, and cases have been recorded where bees have obtained much food from the stubble of wheat, corn, and other plants of that kind. The nectar of the flowers of the cactus contains cane sugar only. Cane sugar is also found in varying proportions in the nectar of most other plants.

Cane sugar dissolves in one-third of its weight of cold water, and in all proportions of boiling water. It has a sweetening power of 100; grape sugar having 60. It melts at 320° Fah., and on cooling forms the transparent substance known as barley sugar. When heated to 400° to 410° it loses water and becomes brown; it is then no longer capable of crystallization, and is called *caramel.* Indeed, cane sugar is so susceptible of change by heat, that if a colorless solution of it be exposed for some time to the temperature of boiling water, it becomes brown and partially uncrystallizable. Acids also effect this change. Tartaric acid added to a solution of sugar and boiled, prevents the formation of crystals, and no crystals can be obtained even after the acid has been thoroughly neutralized by chalk or carbonate of lime.

Cane sugar is (with bee-keepers) a favorite winter food for bees. Experience has shown that it answers admirably, and its composition shows that it is entirely combustible, leaving no ashes or residue, whether it be burned in the organism of the bee or the furnace of the chemist. It has a greater heat-giving power, weight for weight, than other forms of sugar. But since pure sugar contains no muscle-forming material, it may be doubted if it alone will sustain a colony of bees which may be compelled to exert themselves either for the purpose of gathering food, or for that peculiar activity which they show when exposed to great cold.

As bee-keepers may have occasion to calculate the weights and

* The cane is regarded by botanists as a gigantic grass.

bulks of given quantities of syrup, we give a few figures. The quantity of sugar dissolved is 100 parts; the amount of water by weight is given in the first column, and the specific gravity of the resulting syrup in the second column.

| Parts of Water. | Spec. Gravity. |
|---|---|
| 50 | 1·345 |
| 60 | 1·322 |
| 70 | 1·297 |
| 80 | 1·281 |
| 90 | 1·266 |
| 100 | 1·257 |
| 120 | 1·222 |
| 140 | 1·200 |
| 160 | 1·187 |
| 180 | 1·176 |
| 200 | 1·170 |

As water has a specific gravity of 1,000, and a gallon of water (231 cubic inches) weighs 8·339 lbs., it is easy to calculate the weight of a gallon or a quart of syrup containing any known amount of sugar. Or from the weight of a gallon or quart we can tell how much sugar it contains.

**Sulphur.**—*n.* A well known substance of a yellow color. It is one of the chemical elements—that is to say, it cannot be manufactured by combining any other known substances. It occurs as a mineral in some volcanic regions, especially Sicily, and is also obtained from iron pyrites, which is a compound of iron and sulphur. It is found in commerce in three forms: 1. Crude sulphur or brimstone, which is simply the sulphur solidified in masses like stones. 2. Roll sulphur, which is the preceding, purified and cast in moulds so as to form rolls or sticks. 3. A fine powder prepared by distilling or subliming the common sulphur and condensing the vapor. It melts at 232° Fahr., and between this point and 282° it is quite liquid. When still further heated it becomes thick and viscid, but again becomes liquid just before it vaporizes. Therefore, in melting sulphur for making matches, it should not be made too hot. Sulphur is easily converted into vapor without being burned, and in that case it is not so deadly as when combined with oxygen so as to form sulphurous acid (sulphurous anhydride), or in other words, when it is properly burned. In the latter case it produces a heavy gas of a very penetrating and suffocating nature which effectually destroys all insect life, whether in the form of mature bees, moths, or the larvæ of either. This gas, however, quickly diffuses in the air, and does not leave any taint on the comb or honey exposed to it. But if we expose honey to the unburned vapor of sulphur, the latter condenses on the comb or honey, and leaves a very disagreeable taste and odor. And as sulphur is not volatile at ordinary temperatures, this taste and odor are very persistent.

**Sulphur.**—*v.* To kill by exposure to the fumes of burning sulphur. A process now used by intelligent persons only for destroying the moth in its various stages.

**Super.**—A hive set over another so that the bees may work in it.

**Super, Bar.**—A bar super is simply a case or crate in which the honey-comb is hung from bars (q. v.) instead of being built in sections or boxes.

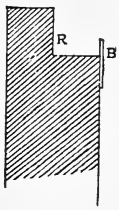
**Super, Divisional.**—English writers apply the term "divisional super," to a set of long sections reaching across the entire width or length of the hive, and held together somewhat after the manner of closed end frames.

**Super-hive.**—*v.* To set one hive above another.

**Super-hiving.**—The opposite of Nadir-hiving (q. v.)

**Superior Hive.**—The uppermost of a storified set.

**Super, Sectional.**—A super or case placed over the frames or honey board, and containing sections (q. v.)



METAL SUPPORT ATTACHED TO RABBET.

**Support, Metal.**—A strip of metal fastened to the edge of a rabbet for the purpose of supporting the frames. Improperly called a metal rabbet. A common form of metal support, bearing or runner (as some English writers call it), is shown in the annexed engraving at B. See *Rabbet*, where another form is shown.

**Swarm.**—A new colony produced by an old stock. *Prime* swarms consist of the old queen and an indefinite number of workers of all ages, together with some drones. *After* swarms (called also second, third, etc., swarms) consist of one or more young queens followed by workers, and perhaps drones. See *After-swarm.*

The term, colony, is very apt to be confounded with swarm. The difference is this: A *swarm* is a young colony just detached from the parent stock. The idea which attaches to the word *swarm* is, that either under the influence of the so-called swarming fever, or by the direct agency of man in dividing them, the old colony has split up into two or more parts, one of which maintains the identity of the old stock, while the other seeks a new home. See *Stock.*

**Swarm, Artificial.**—A new colony formed from one or more old colonies by the direct agency of man.

**Swarming Basket** } A box or basket fastened when neces-
**Swarming Box** } sary to the end of a long pole, and used for taking swarms from a tree or bush and hiving them. The box or basket is held directly beneath the swarm, and the bees brushed into it with a feather, or where the limb is inaccessible and better facilities are not at hand, the limb may be shaken so

that the bees will fall into the box. This may be done in some cases by placing the upper end of a stick against the branch to which the bees cling, and striking the lower end sharply with a mallet. The bees fall off, but very few take wing, and there is no danger of killing the queen.

**Swarming Impulse.**—A desire or tendency on the part of bees to swarm. The conditions under which it occurs are not fully understood, but that it is a definite desire or impulse, nearly as much so as the fever of fowls when wishing to set, there can be no doubt, and the most effectual way of stopping it probably, is to gratify it in appearance at least. The honey-extractor is said to keep it down very effectually, but cases have been known in which even this failed. Query: Has it any connection with a greatly developed wax-secreting condition? If so, the most effectual method of subduing it would be to set the bees at work building new comb for a few days, as well as giving them room for new stores of honey.

**Swarm, Late.**—A swarm which comes off after the usual swarming season is past.

**Swarm, Natural.**—A new colony formed by the instinct of the bees without the *direct* interference of man. Such operations as feeding to promote brood-rearing and to excite the swarming impulse, do not constitute *direct* interference.

**Syrian Bee.**—A race of bees found in Syria. Frequently confounded with the bees found in the country to the south of Syria. See *Holyland Bee.*

**Take Up, To.**—To destroy bees for the purpose of getting the comb and honey.

**Tested Queen.**—See *Queen, Tested.*

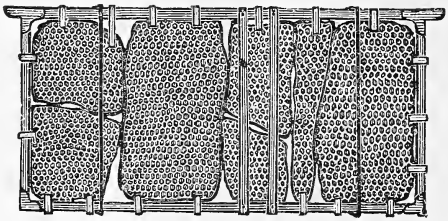
**Tier Up, To.**—To place one hive on the top of another so as to give the bees more room. The operation may be repeated several times.

**Top Box.**—A box placed on the top of a hive for surplus honey.

**Transfer.**—To change the comb and bees of a stock from one hive to another. The term transferring has, however, come to have a special significance, and is commonly used to denote the operation of changing bees and comb from box-hives to movable comb hives, or, indeed, to change the comb from one frame to another. And if any one could be found who changed his comb back to the box hive, this operation also would be called transferring. A quantity of comb transferred to a frame is shown in the illustration on the next page. The comb is held in place in this frame by means of wires, clasps and slats.

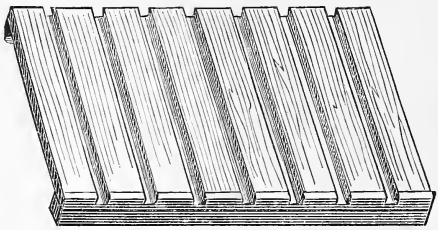
There is another operation, however, in daily use in extensive apiaries, and that is the transposing of frames and bees from one hive to another. This operation, strictly speaking, should not

be called "transferring" but *transposing* or *re-hiving*. See *Re-hive*.



COMB TRANSFERRED TO FRAME.

**Transferring Board.**—A board with grooves used in transferring. The frame and comb lie flat on the board, and the wires or slats, seen in the previous figure, lie in the grooves so as not



TRANSFERRING BOARD.

to be pressed into the comb. In the figure the grooves are simply spaces between narrow boards or slats which are nailed to two cross pieces.

**Transpose.**—When frames and bees are moved bodily from the shell or outer case of one hive to that of another, the term "transpose" might be used. In this way we would avoid confusing the simple operation of changing boxes with the more elaborate and difficult one generally known as "transferring."

To transpose a *colony* is one thing, however, and to transpose frames of comb is another. The latter may be performed in the same hive by simply re-arranging the frames. As a single word, denoting the changing of a colony from one hive to another, without the operation of transferring, we prefer the term *re-hive*.

**Treble**
**Triple**
**Triplicate** } *v.* To add a third hive or box to two that were previously occupied by one colony.

**Triplet.**—A stock that has three hives or stories.

**Twin-stock.**—A word which has been borrowed from the German. It signifies a hive containing two colonies.

**Uncapping.**—To remove the caps from the cells of sealed or capped honey. This is always done before the combs are placed in the extractor.

**Unfertile.**—This term may be applied to either queens or eggs. It means incapable of producing young. See *Sterile.*

**Unicomb Hive.**—A hive having only one comb, and generally with glass sides. An observable hive.

**Unite.**—To make one colony out of two or more.

**Uniting Spirit.**—A mixture of spirit of peppermint, water and honey used for sprinkling bees to give them the same odor, so that they may be united more easily. *Dzierzon.*

**Unqueen.**—To remove a queen and leave the colony queenless. This term saves much circumlocution.

**Unripe Honey.**—Honey from which the water has not been sufficiently evaporated.

**Untested Queen.**—A queen whose progeny has not been examined or tested.

**Variety.**—Any form or condition of structure, under a species, which differs in its characteristics from those typical to the species, as in color, shape, size, and the like, and which is capable either of perpetuating itself for a period, or of being perpetuated by artificial means; also, any of the various forms under a species, meeting the conditions mentioned. Amongst naturalists, a form characterized by an abnormity of structure, or any difference from the type, that is not capable of being perpetuated through two or more generations, is not called a variety. Varieties differ from species in that any two, however unlike, will mutually propagate indefinitely, unless they are in their nature unfertile, as some varieties of rose and other cultivated plants; in being the result of climate, food, or other extrinsic conditions or influences, but generally by a sudden, rather than a gradual, development; and in tending in most cases to lose their distinctive peculiarities when the individuals are left to a state of nature, and especially if restored to the conditions that are natural to typical individuals of the species.—*Webster.*

Varieties differ from races and breeds in the suddenness of their appearance. The development of a race or breed is gradual—often the result of agencies which have acted for hundreds of years.

A variety also differs from a race in that the latter tends more and more to establish its distinctive features, and loses its tendency to "cry back" (q. v.), consequently, a variety is generally confined within narrower limits than a race. And it differs from a

"breed" not only in the points just mentioned, but also in the fact that the latter is always to a certain extent artificial. In short, a variety partakes largely of the nature of a "sport," as it is called by horticulturists.

The term *variety*, however, is used almost wholly by scientific men—naturalists in every department. Practical stock-breeders, whether of Durham cattle or of bees, use the words *race* and *breed*.—See *Species, Strain.*

**Veil, Bee.**—A veil used by bee-keepers to protect them from the stings of the insects. There are different methods of ar-

BEE VEIL.

ranging the veil, one of the best being that shown in the engraving, copied from Quinby's work on Bee Keeping.

**Ventilate.**—To change the air in any place. In the hive ventilation is effected in two ways: *Naturally*, when the bees by the action of their wings produce currents of air which penetrate to every part of the hive; *Artificially*, when the bee-keeper establishes a current of air by means of suitably arranged openings. Artificial ventilation in winter has been extolled on the one hand as the greatest aid in safely wintering colonies, while on the other it has been condemned as contrary to the habits of the bee, and the probable cause of more losses than any other device.

**Virgin Comb.**—Comb which has been used only once for honey and never for brood.

**Virgin Honey.**—Honey taken from virgin comb (q. v.) By some this term is applied only to the honey gathered and stored by a swarm of the same season that the honey is taken. Some authors define virgin honey as that which drains from the combs

without pressure or heat, and this seems to be the definition accepted by most of our standard authorities.

**Virgin Queen.**—See *Queen, Virgin.*

**Virgin Wax.**—Wax from virgin comb (q. v.) Virgin wax is frequently prescribed in the older recipes for various industrial purposes, but with our modern methods and systems of purifying wax, any bright yellow wax is as good as what is known as virgin wax.

**Warranted Queen.**—See *Queen, Warranted.*

**Wax.**—When "wax," simply, is spoken of, beeswax is always understood. In this place vegetable wax and mineral wax have no interest for us except as adulterants, which are to be avoided. Wax is secreted by the bees, is formed into scales in the wax-pockets (q. v.), and is thence taken into the mouth, where it is kneaded with saliva until sufficiently plastic to be used in building the cells. There are two kinds of wax in market—common beeswax and Andaquies wax, which is produced by a small bee found on the plains of Orinoco, above the Magdalena River. Like the Apis dorsata, these bees attach their combs to the limbs of trees. This wax has a rather higher melting point than common beeswax, and hence if it could be procured in quantity and should prove sufficiently plastic, it might prove exceedingly useful in the manufacture of foundation. Lewy gives its specific gravity as ·917, and its melting point as 170° Fahr.

Common beeswax has a specific gravity of ·960 to ·965, and a melting point of 145° to 150° Fahr. The process of bleaching raises the specific gravity to ·990, and the melting point to 155° Fahr. At 85° wax becomes plastic, so as to be easily moulded or kneaded, and at this temperature pieces which are pressed into contact unite into one mass. Proctor says, that at this temperature "its behavior while worked between the finger and thumb is characteristic." A piece the size of a pea being worked in the hand till tough with the warmth, then placed upon the thumb and forcibly stroked down with the forefinger, curls up, following the finger, and is marked by it with longitudinal streaks.

Wax is freed from honey and adhering impurities by being melted in water, to which vinegar, alum, or a little nitric acid has been added. For the best methods of purifying and bleaching wax, see article *Wax* in the forthcoming "Treasury of Practical Information."

The adulterations of wax are various powders—starch, clay, etc.; resin; tallow and suet; and lastly, paraffin. Powders may be separated by disolving the wax in turpentine, when the powders will be left. Resin may be detected by its peculiar terebinthinate (turpentine) taste, and by its solubility in *cold* alcohol, in which wax is insoluble. When resin is present the fracture of the wax is shining instead of granular. Greasy matter is easily detected by the unctuous feel and disagreeable taste. Wax

with which paraffin has been mixed melts at a temperature too low to allow it to be used for foundation. The wax may be separated by a strong solution of alkali, which has no effect whatever on paraffin.

**Wax Extractor.**—A piece of apparatus for separating wax from other impurities, such as bee-bread, dead bees, etc.

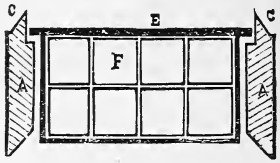
**Wax Moth.**—See *Moth.*

WAX POCKETS.

**Wax Pockets.**—Small cavities found on the under side of the bee, in which the secreted wax is collected and kept till required for use. In the honey bee these pockets are found under the abdomen, and there are eight of them—four on each side. The stingless bees of South America collect the wax on the back.

**Wedding Excursion** } When the queen leaves
**Wedding Flight** } the hive for the purpose of meeting the drones, she is said to take her wedding flight. Also called marriage flight.

**Wide Frames.**—Frames which are so wide that sections may be placed in them and hung in the hive. The term is to be preferred to *broad* frame, as the latter is apt to be mistaken (especially when written) for *brood* frame. The figure shows a wide frame with sections hung in a hive.




WIDE FRAMES AND SECTIONS.

**Wild Bees.**—These differ in no respect from the bees originally kept in hives, except in the fact that they have taken up their abode in some natural cavity in tree, rock, or even the ground. This will be seen at once when we remember that most of the colonies found in the woods have absconded from some apiary. Even pure Italians have been found in the condition of wild bees.

**Wind Breaks.**—Fences or rows of trees so arranged as to break the force of the prevailing winds.

**Wine, Honey.**—Mead.

**Wintering.**—During nearly five months of the year (from November 1st to April 1st) bees in northern latitudes are confined to their hives, often for months at a time. During this period, if neglected, they are exposed to cold, to the use of unsuitable food, and even to actual starvation. The beekeeper, by proper care, protects them from cold, provides them with a sufficiency of good food, and in other respects sees that they are guarded from those evil influences against which they themselves are at this season powerless. This is called *wintering.* The

wintering of bees, as at present practiced, is not conducted so as to secure uniformly successful results, and he who will place it on a sound scientific basis will add millions to the annual income of the country.

**Winter Passages.**—Passages made through the combs so that the bees can pass to the different combs without having to go under or around them. As the combs, where not covered by bees, are very cold—often frozen—in winter, any bee that attempts to crawl over them is lost, while if she could go *through* the combs, without leaving the cluster, she might be able to reach a supply of food and so sustain life. To enable her to do this, it is the practice of some of our best apiarists to cut holes in the combs about two or three inches below the top of the frames, and as the bees are apt to fill these holes up, many insert a tin thimble in them to keep them open. We object to tin, or any metallic substance amongst the bees in winter, and greatly prefer a wooden tube made by rolling a thick shaving round a roller, and tying it with very fine wire. The wood being a poor conductor of heat is greatly better than tin. Such thimbles should be inserted in the foundation—thus saving the bees the labor of building comb which is to be afterwards cut out. At least four frames in every hive should have these thimbles. If they should come into extensive use they could be easily and cheaply turned out of some firm wood. The internal diameter need not be more than half an inch, and they should be quite thin. We have tried paper and pasteboard, but the bees gnaw them. We greatly prefer two or three of these small holes to one large one. They should be at least three or four inches apart. Where tin tubes are used they should be heated and dipped in melted wax, so that the metal surface may be completely covered.

Hill's device (q. v.) is intended to answer the same purpose, but we do not think it quite as efficient. Perhaps *both* would be best.

**Wired Foundation.**—See *Foundation.*

**Wired Frames.**—See *Frames.*

**Wolf's Bladder.**—Puff ball.

**Worker Bees.**—These are the undeveloped females that gather the honey and pollen, secrete wax, raise the brood, defend the hive, and perform all the other active duties of bee-life, with the exception of laying eggs.

**Worker Eggs.**—Properly this term should signify eggs laid by workers. More frequently it is used (improperly, we think) to signify eggs that will *produce* workers. See *Egg.*

**Worker, Fertile** } A worker whose ovaries have been so far
**Worker, Laying** } developed that she lays eggs. As these workers are never impregnated, their progeny are always drones. The term "fertile" worker has been objected to, but it is strictly proper.

**Worm.**—A common but very improper name for larva (q. v.) of bees or moths. Worms never change to flies, bees, or butterflies. They are not insects.

**Worms.**—The larvæ of the bee-moth are frequently, but improperly, so called. Indeed, when "worms" are spoken of by the ordinary beekeeper, the larvæ of the bee-moth are almost always meant.

# APPENDIX.

**Apiology.**—A discourse about bees. The literature of bee-keeping.

**Apist.**—A bee-keeper (*inelegant*).

**Apistical.**—Relating to bees or bee-keeping.

**Artifficial Comb.**—It is no wonder that the idea that artificial comb is a regular article of manufacture should take a deep hold of the popular mind, when so many journals and books speak of it as an accomplished fact. In the "Mutual Admiration Society's" Cyclopædia* we are gravely told that *Dr. John Long* has invented a machine "that turns out combs with cells, rivalling, if not excelling, the natural product"!!! This will bring a smile to the faces of readers of back volumes of the *American Bee Journal.*

In noticing the substitutes for comb we ought not to omit mention of the fact that it was by transferring the larvæ to glass tubes, made in the form of cells, that Huber was enabled to watch the process of cocoon-spinning. See "*Nouvelles Observations sur les Abeilles.*" Par *Francois Huber.* Geneve 1814. Vol. I., p. 221.

**Frames.**—The following comparison of the comb-surface exposed by completely filled frames of the various sizes in use is interesting. I have assumed that the top bar is $\frac{3}{8}$ of an inch thick; the end and bottom bars $\frac{1}{4}$ inch each. In frames as made by some makers these dimensions vary slightly, but by actual measurement I find that the sizes I have given are not far out of the way. The Standard Frame of the British Bee-Keepers' Association is 14 inches long by $8\frac{1}{2}$ inches deep, the top bar being $\frac{3}{8}$ of an inch thick, and the end bars (or side bars, as our cousins call them, not very properly) $\frac{1}{4}$ of an inch. This gives exactly three-quarters of a square foot, and is the smallest frame in use for any except nucleus hives. Of course, in order to get the entire surface of comb exposed (as in estimating amount of

* Johnson's—So called because each of the several hundred editors and contributors had his "biography" published in it. This, of course, left no room for any account of such men as Langstroth, Dzierzon, Wagner, and many others whose work really deserves recognition. Even Lawes, who has probably done more than any other living man for the Science of Agriculture, and whose name is familiar to every student of the subject, is not so much as mentioned.

brood), the quantities given in the table must be doubled, so as to include both sides.

| Frame. | Area in Square Inches. | Area in Square Feet. |
|---|---|---|
| Quinby—open end | 191 | 1·326 |
| " closed end | 193 | 1·340 |
| Langstroth—Simplicity | 145·56 | 1·010 |
| " Standard | 143·43 | ·995 |
| Adair | 135·47 | ·940 |
| American | 130·75 | ·908 |
| Gallup | 114·22 | ·793 |
| British Standard | 108 | ·750 |

**Frame, Broad-shouldered.**—A frame with the top bar made wide at each end for the purpose of keeping the frames a proper distance apart.

**Frame, Cold.**—A frame which runs lengthwise of the hive—that is, having the end bars against the entrance.

**Frame, Warm.**—A frame which runs across the hive—that is, having the bottom bar parallel with the entrance. Why it was called a "warm" frame we do not know, except perhaps that it was thought that the outer frames, with their sheets of comb, would act as a protection from cold draughts of air. See *Frame, Cold, Supra.*

**Fungicide.**—A destroyer of fungi. A term applied to certain chemicals which have powerful antiseptic qualities, due, it is supposed, to the fact that they are very destructive to minute fungi. Prominent among these chemicals are borax, salicylic acid, sulphur, sulphurous acid, etc.

**Lugs.**—(Scotch and Provincial English for *ears*). The arms of frames are sometimes inelegantly so called.

**Midrib.**—A term sometimes improperly used for septum (*q.v.*)

**Runner.**—A thin-edged bearer or support for the arms of the frames The term is not a good one.

**Subtend.**—This term has been used (not very properly) to denote the placing of one hive under another.

**Swarm.**—*v.* This term is used both in reference to the old colony and the new swarm. A stock is said to *swarm* when it throws off a new colony, and a new colony is said to *swarm out* when it leaves the parent stock.

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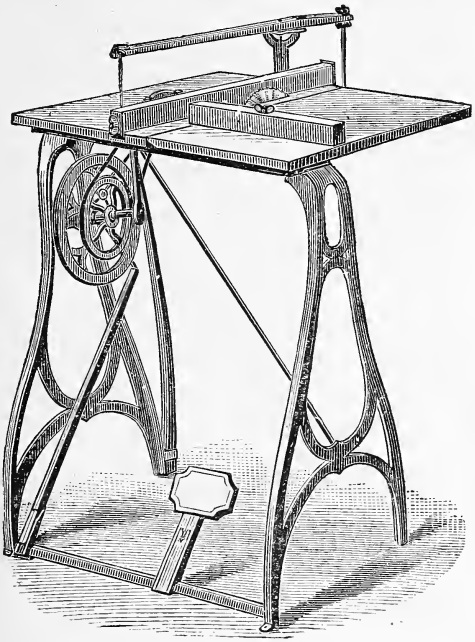

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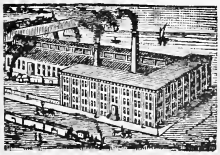

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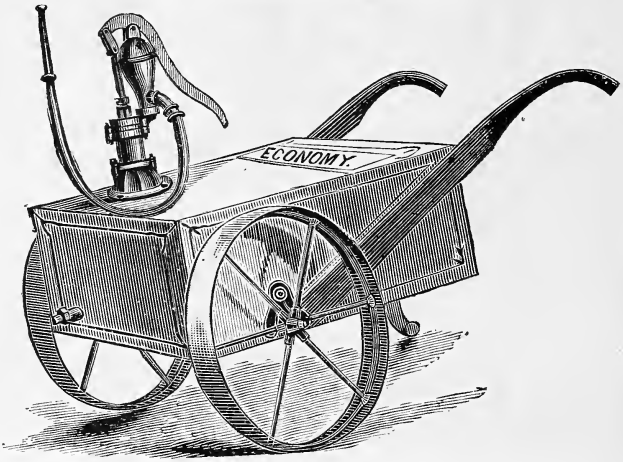


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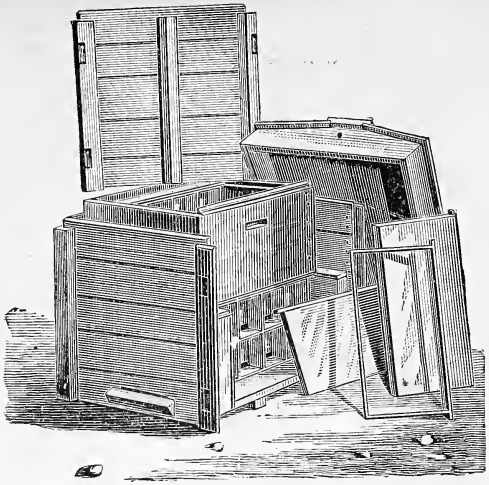

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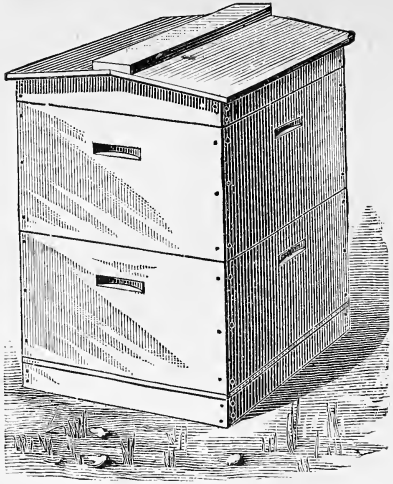

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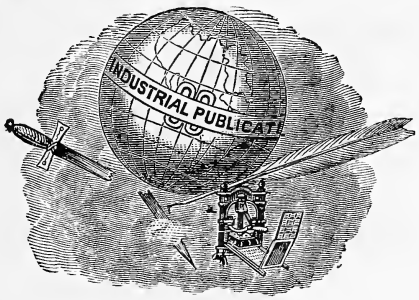


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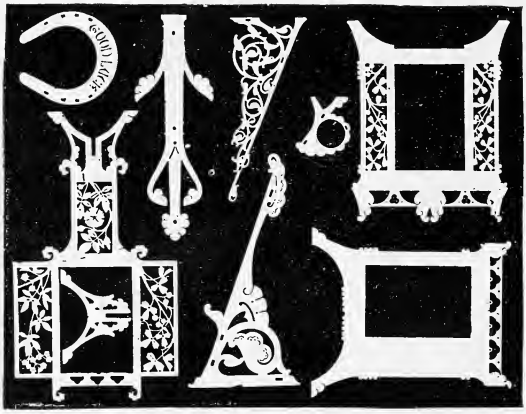

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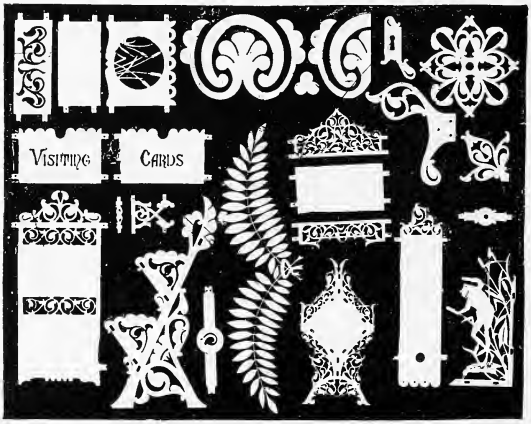


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